# The Chemical Age

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*NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.*

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## The Future of Artificial Silk

SOME weeks ago we published a plain but interesting article, in popular terms, on the process of artificial silk manufacture, with some account of the rapid development of the industry. The daily journals seized upon it, and adorning the story with picturesque head-lines such as "Silk-worms threatened with unemployment," moralised on the coming triumph of the synthetic over the natural product. Lord Rothermere has now done even better. He sees, not merely the supersession of the silk-worm, but a threat to our whole textile industry—cotton, linen, wool, and jute—coming from what is called the "mass production" of artificial silk at a price below that of cotton and wool, and he bids the textile industry take heed of the new continental, especially the Italian, offensive.

Lord Rothermere and his high staff writers, with their batteries of italic sentences and brightly-beaming captions, sometimes incline to the alarmist mood, and perhaps they are a little alarmist now. But there is in Lord Rothermere's case one practical point of real value which it would be unwise to overlook. The aim of the artificial silk producer has generally been to produce a substance bearing as close a likeness as possible in appearance and quality to the natural article. They have succeeded wonderfully, producing a substance which excels the natural article in brilliance, possesses many of its merits, and can be sold at a substantially lower figure. At present this country is the largest producer of artificial silk in the world, and in accordance with British tradition we have aimed at and are actually producing the highest quality. The new continental policy, we are now told, aims at the production, in larger quantities and at a cheaper price, of material of a commoner quality and therefore likely to pass into more common use. The suggestion is that, when the processes are perfected, it may largely supersede cotton, if not wool, and the cotton industry must look to its future.

There is certainly substance in this point. Germany, before the war developed great world markets in cheap cutlery, cheap hosiery, and so forth, largely because British makers clung to the doctrine of quality of output. It was against the tradition of British production to descend to "shoddy." But rival producers, by making "shoddy" goods attractive, cheap, and serviceable to the degree popularly required, developed great industries out of lines neglected by our own makers. And as the demand increased so were they able to reduce the costs of production and still further to extend the market. The same thing might very well happen in the artificial silk industry if we held too stubbornly to the production of only the finest and the best, and relied on the luxury trade to the exclusion of the bread-and-butter article. We see no reason to suppose that Great Britain, which has secured so largely the control of the industry, will make this mistake, but it is a good policy to ensure against it in time.

So far as the trade is concerned the discussion is not resented but rather welcomed. At the least it is a great advertisement for the synthetic product. The large artificial silk producers in this country are not disposed to say much on the subject at present, but they clearly recognise the great opportunities before the industry and have no intention of neglecting them. Mr. C. F. Cross, whose chemical researches have so largely laid the basis of the industry, is confident that we can maintain the lead we now hold in the chemistry and technology of the industry—not only in the production of yarn but in its conversion into actual fabrics of great variety and great beauty. Large fortunes have been already made in the industry, and more, Mr. Cross thinks, may yet be made. But fortune-making is less important than industry-making. What may be the ultimate effect on the cotton industry no one can say. The science which has beaten the

silk-worm may yet surpass both the cotton plant and the fleece-producing sheep. Already artificial silk is being combined with cotton in the looms of Lancashire, and one can foresee immense developments in its use either alone or in combination with other material. There is one satisfaction to all of us in this case. In no country is the chemistry of the subject better understood or better appreciated than in Great Britain, and an industry which appreciates its chemists rarely goes to the wall.

## Overseas Chemical Trade

TEH Board of Trade figures relating to overseas chemical trade in August are a little disappointing, since they show, as compared with the month of July, both an increase in chemical imports and a decrease in chemical exports—the returns, therefore, being against us in both directions. It is true that the exports have increased in comparison with the corresponding figures last year, although even on this basis coal, coke, manufactured fuel, and raw and manufactured iron and steel show a serious falling off. The exports of chemicals, dyes, drugs, and colours total £2,015,404 in value, against £1,644,943 in August of last year, but compared with July of this year this represents a rather serious decline of £192,053. The import figures, from our point of view, are also unfavourable. While they are lower by £44,833 than in August, 1923, they are higher by £124,582 than in July of this year.

Nitrate of soda imports, though showing an increase over the July figures, were considerably lower than in August of 1923; in fact the fall in the total value of imports is more than accounted for by this item alone. Another considerable decrease also occurred in the case of nickel oxide, but otherwise the majority of products have been imported in increased quantities, particularly tartaric acid and tartrates, bleaching materials, barytes, white lead, and painters' materials, while coal tar dyestuffs have also been imported in somewhat greater amount. On the export side sulphuric acid, caustic soda, carbonate of soda, bleaching powder, barytes, white lead and many other items have again increased. Sulphate of ammonia is once more on the up-grade, mainly due to the large quantities taken by Spain and the Canaries which have been by far the best overseas customers this year. Japan continues to take a reduced quantity. Many of the coal tar products show a falling off from the peak figures of last year, the only exceptions being tar oil and creosote oil. Coal tar dyestuffs fell from 12,830 cwt. to 9,054 cwt., against only 2,868 cwt. in August, 1922.

## Wembley Next Year?

SOME tentative inquiries made among the chemical exhibitors at Wembley reveal but little enthusiasm for a reopening of the Chemical Section next year, at least on anything approaching its present scale. Should the Empire Exhibition be continued in 1925, no doubt many chemical concerns would be represented, but few would welcome any very heavy outlay. On the other hand, one hears many opinions in favour of prolonging the exhibition this year. Wembley is just now attracting great crowds of visitors and many exhibitors feel that they should get the full benefit of this continuing and even increasing interest. The Chemical Section has amply justified itself and attained its primary end of convincing the public that Great Britain chemically is a producing nation and not merely a nation of importers. It was not intended for taking orders across the counter, though the firms which sell direct to the people such articles as soap, perfume, and so on have done well. The heavy and fine chemical people have had comparatively few actual orders but many inquiries, and they seem quite content to await the good results that are sure to appear ultimately.

## A Chemical Misnomer

THE suggestions which from time to time are made respecting the destructive character of chemical agencies recall a wise remark we heard while visiting some time ago the headquarters of the American Chemical Warfare Service at Edgewood. One member of the party was Colonel McMullen, who later came over here to preside over the international commission on claims for war inventions. He remarked on the popular prejudice likely to be caused by the title Chemical "Warfare" Service, and suggested that some such name as National Chemical Service would far more correctly describe the real aims, and avoid popular misconception. Although the word "warfare" is still retained in America the work is actually developing more and more on peace lines. Attention has already been drawn to the efforts to find means of exterminating the destructive cotton boll weevil. Another example is the use of chloropicrin to displace heat in smothering silkworm cocoons. The process is said to be cheaper and easier to control, and the silk so obtained is equally good as regards elasticity, tenacity, and degumming. Another example of the excellent industrial work of the C.W.S. is found in the protection of marine piling and other structures from the toredo borer, which in one year in a single harbour caused damage amounting to 19 million dollars. It is properly pointed out that these advances would have been difficult without the mass of toxicological knowledge brought together at Edgewood.

Apart from these matters, it is a popular habit to think of explosives as mainly intended for war. As that excellent magazine, *The Explosives Engineer*, published by the Hercules Powder Co., shows month by month, explosives are to-day used for a great variety of industrial operations, particularly mining and excavation. We learn that a contract for 100 million lb. of explosive—a larger contract than any issued during the war—has just been placed by the U.S.A. Government with the du Pont Co., and the explosive is to be specially prepared for use in the construction of highways, in agriculture, and in a number of other industrial directions. These examples are not without interest as showing that the application of chemistry to war or other purely destructive uses is far more an incidental than a primary object.

## Engineer and Works Chemist

MR. A. E. PAGE, in his paper at Wembley this week on co-operation between the engineer and the works chemist, re-emphasised the familiar arguments against the isolation of the two services and in favour of their co-operation to the fullest extent possible. Lack of co-operation is frequently attributed on the one hand to the chemist's love of seclusion in his laboratory and distaste for the practical difficulty of works practice; and on the other to the engineer's inclination to treat the chemical department as rather an inferior side-line. How far these theories represent the actual attitude no one can exactly say, but one thing is certain—the process of mutual understanding is proceeding satisfactorily, each type recognising more clearly the complementary functions of the other, and together working for a higher standard of operative efficiency. Also, though perhaps more slowly, the commercial interests which engage both are learning the need and the advantage of adequate works laboratories. It is a false view to count beforehand on tangible results from the research side that will immediately repay the expenditure. Research must be instituted from a quite different point of view; but it usually does happen that research in the long run pays its way, indirectly in most cases, but sometimes in a surprisingly direct way. Mr. Page mentioned one case where a single improvement equalled the entire laboratory expenditure for a year, and others could be cited in the same direction. But whether these visible results come at once or not, the research staff always ultimately justifies itself by the more exact knowledge of materials and processes that it brings and as an insurance against the fatal danger of falling out-of-date. The more closely it co-operates with all the other interests the more useful it is bound to become.

## Franco-German Potash Agreement

THE agreement concluded on August 14 at Basle between the interests controlling the French and German potash industry for allocating 67·5 per cent. of the exports to the United States to Germany and 32·5 per cent. to France, is causing some anxiety in America. The Department of Commerce has already ordered an immediate investigation to ascertain the probable effect of the agreement on the American potash trade, and the conclusions reached will be published without delay. Even if the inquiry should show the probable results to be inimical, Mr. Hoover, Secretary of Commerce, admits that nothing can be done at present to meet such a situation. The only remedy he can suggest is such a relaxation of the anti-trust regulations as would permit American potash importers to combine in the purchase of raw materials controlled abroad in much the same way that exporters are permitted to combine in the shipment of American goods to foreign markets. So far the agreement has produced no increase in the American selling price, and the effect on prices is, of course, one of the principal points.

## Points from Our News Pages

The first instalment is published of a comprehensive survey by Dr. Cottrell, Director of the U.S.A. Nitrogen Fixation Laboratory, of the nitrogen fixation problem (p. 282).

A sketch of developments at the chemical works of Hickson and Partners, Ltd., illustrates recent progress in dyestuffs production. (p. 285).

Further notes on the British Empire Exhibition include reference to some interesting chemical exhibits (p. 287).

Two papers of considerable chemical interest—one dealing with co-operation between engineers and works chemists and the other with the Ceylon plumbago industry—were read and discussed at Wembley on Monday (p. 288).

The Board of Trade returns for August indicate an increase in chemical imports and a decrease in chemical exports as compared with July (p. 290).

A new type of mechanical stoker and a new colour testing lamp are described (pp. 292–3).

Applicants for new patents include British Cyanides Co., British Celanese, Ltd., British Dyestuffs Corporation, H. E. Coley, Ltd., H. Dreyfus, Scottish Dyes, Ltd., and Synthetic Ammonia and Nitrates, Ltd. (p. 299).

A fairly satisfactory turnover is reported in the London chemical market, but export business is very quiet. The heavy chemical market in Scotland continues quiet, though Continental inquiries are numerous (p. 300).

### Book Received

DIE SCHOKOLADEN-FABRIKATION. By Dr. Paul Zipperer. Berlin: M. Krayn. Pp. 338. $5.

## The Calendar

| | | |
|---|---|---|
| Sep. 13 to Oct. 25 | Royal Photographic Society of Great Britain: 69th Annual Exhibition. | 35, Russell Square, London, W.C.1. |
| Sep. 18 & 19 | Ceramic Society: Refractory Materials Section Meeting. | Conference Hall, No. 4, Wembley. |
| 20 to Oct. 1 | British Commercial Gas Association: Thirteenth Annual Conference. | Liverpool. |
| 1 | Society of Public Analysts: "The Determination of Coconut Oil and Butter Fat in Margarine," by G. D. Elsdon and Percy Smith, and other papers by F. Knowles and J. C. Urquhart, Miss W. N. Nicholson and D. Rhind, Miss M. B. Richards and W. Godden, and W. S. Shaw. 8 p.m. | Chemical Society's Rooms, Burlington House, London. |
| 2 | Society of Chemical Industry (Bristol Section): Joint Meeting with local Section of the Institute of Chemistry: "Combustion Control in Boiler Houses." H. T. Ringrose. 7.30 p.m. | The University, Woodland Road, Bristol. |
| 3 | Society of Chemical Industry (Manchester Section): "Science and Industry." W. J. U. Woolcock. 7 p.m. | Manchester. |
| 7 | West Yorkshire Metallurgical Society Annual General Meeting, 7.30 p.m. | George Hotel, Huddersfield. |
| 8 | Liverpool Chemists' Association: "The Chemistry of Food." Dr. W. J. Melhuish. | Liverpool |
| 16 | Chemical Society. Ordinary Scientific Meeting. 8 p.m. | Burlington House, Piccadilly, London. |
| Nov 4 | West Yorkshire Metallurgical Society Discussion on "The Influence of Casting Temperatures on the Physical Properties of Non-ferrous Alloys." 7.30 p.m. | George Hotel, Huddersfield. |
| 6 | Society of Chemical Industry (Bristol Section): Joint Meeting with local Section of the Institute of Chemistry: "The Present Position of the Geber Problem." E. J. Holmyard. 7.30 p.m. | The University, Woodland Road, Bristol. |
| 14 | Society of Chemical Industry and Chemical Industry Club: Joint Autumn Dinner | London |

# The Problem of Nitrogen Fixation.—(I)

## By Dr. Frederick G. Cottrell

*In a recent lecture Dr. Cottrell, Director of the U.S.A. Fixed Nitrogen Research Laboratory, Washington, reviewed in considerable detail, from what he described as the common sense point of view, the problem of nitrogen fixation. By the courtesy of the U.S.A. Department of Agriculture we have been supplied with a copy of the lecture, from which the following extracts are taken. Much of the matter relates to what is being done in America, but some of the more general aspects of the problem are not overlooked. The article will be continued in our next issue.*

I SHALL try simply to give a little glimpse of the relationship, as I see it, between the great nitrogen industry as a whole, the large scale manufacturing projects that our government started during the war, and the work that we are engaged upon in the Fixed Nitrogen Research Laboratory at Washington.

The public has come to think of nitrogen fixation as necessarily implying water power. But this assumption we must first examine with care. Electric energy has a relatively high market value compared with other forms, due to its ease of transmission and its ready and complete convertibility at will into any of these other forms of energy. Thus in the pioneering of new chemical fields its very flexibility makes it an invaluable tool, as, through its aid, we can place the energy just where we want it, but the energy so placed is always relatively expensive per unit because the demand for such handy energy is on the whole always growing faster than the supply.

Common sense dictates, therefore, that we be ever on the alert to substitute cheaper and less specialised forms of energy wherever this may be done to advantage, thus cheapening the operation and releasing that much electric energy for other uses. This is particularly important where large blocks of power are concerned and nitrogen fixation, as we shall see, is a notable case in point.

### Historical

The first commercially successful attempt to fix nitrogen was by the arc process some twenty years ago. This was quite naturally the first process to develop because of its simplicity, consisting as it does essentially in passing air through a powerful electric arc to bring about combination of the oxygen and nitrogen to form oxides of nitrogen, and then absorbing these in water to form nitric acid or in alkalis to form nitrates and nitrites.

The process, though extremely simple, has an enormous power consumption (about 65,000 kw. hr. per ton of nitrogen fixed) and consequently is only applicable where excessively cheap electric power is available. Thus the public came naturally, and correctly enough in those early days, to think of nitrogen fixation as necessarily dependent upon the development of large new water power projects. In the meantime research and development have vastly altered the situation, but the public mind has not kept pace with these changes, and this has naturally been reflected by those responsible for guiding our industrial and national policies.

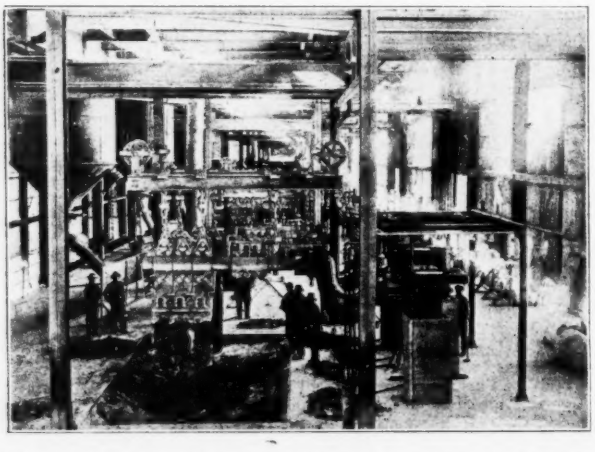

FIG. 1. ONE OF 12 CALCIUM CARBIDE FURNACES AT NITRATE PLANT NO. 2, EACH CAPABLE OF PRODUCING 50 TONS OF CARBIDE PER DAY.

On the heels of the arc came the cyanamide process. This, though considerably more complicated than the arc process, required only about one-fourth as much electrical energy for its operation, but even here the power consumption is still so large that commercial success has only been possible where very cheap power was available.

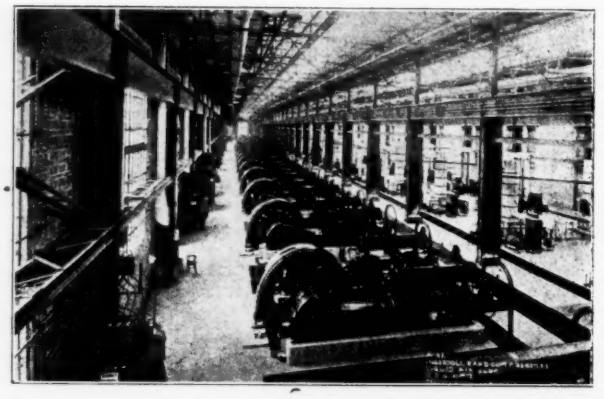

FIG. 2. LINE OF AIR COMPRESSORS; ON THE RIGHT AIR LIQUEFYING AND DISTILLING COLUMNS WHICH FURNISH THE PURE NITROGEN.

Finally in 1913 in Germany came the first commercially successful Haber-Bosch plant for the direct synthesis of ammonia from its elements, hydrogen and nitrogen. It was this plant and process which for the first time released the nitrogen fixation industry from its former absolute dependence upon cheap electric power. The power requirements of this process are only about one-fourth of those of the cyanamide, or a sixteenth of those of the arc, the hydrogen and nitrogen mixture being prepared by the reactions of air and steam on coke in suitable gas producers, followed by catalysing chambers and purifying apparatus. The power requirements of the process are chiefly for compressing the gases thus prepared to pressures of several hundred atmospheres, under which pressures the catalysis to ammonia is then effected.

Thus starting with the arc process, which we may roughly say used only electric power, air, and water, we come next to the cyanamide process largely cutting down the power consumption, but beginning to use more raw materials in the form of coal, coke, and limestone, and finally reach the direct synthetic ammonia process where the consumption of electrical or mechanical energy, as such, becomes relatively insignificant, and the driving energy to put through the chain of necessary reactions is derived direct from coal by chemical processes without the necessary use of electrical power.

There is an alternative form of the direct ammonia process by which we may get our hydrogen from water by electrolysis of the latter instead of treating with coke in a water gas generator, and for small plants, where the electrolytic hydrogen may already be available as a by-product of some other useful operation, this process presents some very attractive possibilities. It may also be used on the large scale where sufficiently cheap electric power is available. When operated in this way the process requires about twenty per cent. more power than the cyanamide process instead of seventy-five per cent. less, as when chemical methods are used in the production of the hydrogen. This circumstance has still further served to confuse the public mind on some of the issues involved at Muscle Shoals.

### Nitrogen Fixation in America

To summarise this latter situation briefly, at the outbreak of the war the United States found itself without adequate provision for an emergency supply of fixed nitrogen within its own borders and incidentally far behind Germany and some other European countries in the development of nitrogen fixation as an element in the national agricultural policy. . . . A careful survey of the situation by the "Nitrate Supply Committee" soon narrowed the immediate question of nitrate preparedness down to a choice between the cyanamide and the direct synthetic ammonia processes. It was clearly realised even at this time that from an economic standpoint, at least as far as new plants were concerned, the cyanamide process had probably become obsolete due to the success of the Haber plant at Oppau, Germany, which started up in 1913 with an annual production of seven thousand metric tons of

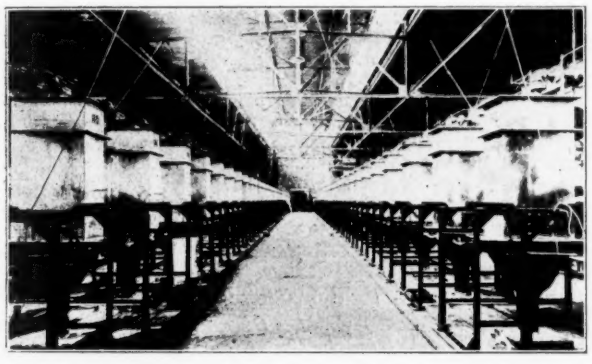

FIG. 3. ALUMINIUM BOXES IN WHICH THE AMMONIA IS MIXED WITH AIR TO FORM NITRIC ACID.

nitrogen, which was later increased to one hundred thousand tons per year, while a second plant of twice that size had already been commenced at Merseburg, Germany. On the other hand, while we had full knowledge and experience n this country regarding the construction and operation of the cyanamide process, such knowledge and experience, especially with regard to large scale operation, was almost wholly lacking on the direct synthetic ammonia process, which was also known to be far more delicate and difficult of control than the cyanamide.

In July, 1917, the argument of ultimate intrinsic efficiency seeming to have prevailed, decision was made to proceed with the erection of a direct synthetic ammonia plant having an annual capacity of about seven thousand tons of fixed nitrogen, but the site for the same at Sheffield, near Muscle Shoals, was not selected by the President until September 28, and the first building material arrived October 19.

### The Muscle Shoals Plant

Under a contract dated November 16, 1917, the American Cyanamide Co., through the Air Nitrates Corporation, a subsidiary organised for the purpose, constructed and put into operation Nitrate Plant No. 2 at Muscle Shoals, having an annual capacity of 40,000 tons of fixed nitrogen. This plant was completed and started operations a few days before the signing of the armistice. Later, thorough test runs were made, netting 2,200 tons of cyanamide besides 1,700 tons of finished ammonium nitrate, and demonstrating the complete availability of the plant for emergency production whenever needed. It would appear, however, to have less direct significance with regard to cheapening of fertiliser manufacture, as figures of its costs of production, even if run to capacity, representing about one-fifth of present total United States consumption, leave little if any margin over present prices.

The outcome of Nitrate Plant No. 1 at Sheffield, justified the Ordnance Department's fears of its uncertainty of regular production on schedule. The first synthetic ammonia was turned out on September 16, 1918, but many operating difficulties were met with and a very considerable redesign of the plant and process were shown to be necessary, though it is now generally recognised by practically all familiar with the subject, that it is in this very direction that lower costs of nitrogen fixation are coming.

What have we really got as assets and liabilities from a national point of view at Muscle Shoals and what can we do with them?

First of all there is the potential water power and the No. 2 or Wilson Dam now under construction which is to harness it. This will represent when finished, about July, 1925, some $50,000,000 investment, and will be the largest single block of concrete work in the world. Four 30,000 h.p. turbines and four 35,000 h.p. units will form the initial installation with provision ultimately for ten more of the larger units, or a grand total in round numbers of 600,000 h.p. With the present unrestricted flow of the river in its upper reaches there will be about 90,000 h.p. of primary or all year power available on completion of the dam; but the remainder of the 260,000 h.p. of the initial turbines cannot be counted on consistently throughout the whole year, *i.e.*, it is what is termed secondary power. With the gradual development of other power plants and control dams on the upper reaches of the Tennessee River and its tributaries, the total flow of the river will, of course, become more uniform and thus more and more of the secondary power at Dam No. 2 will become primary.

The Government also owns a steam power plant adjacent to the dam at Nitrate Plant No. 2 with a capacity of 60,000 kw. already installed and provision for extensions. This, of course, can be used to pick up the load in season of low water and thus also convert secondary into primary power.

### The Cyanamide Process

Nitrate Plant No. 2 (Cyanamide) if run to its full capacity of 40,000 tons of fixed nitrogen per year requires approximately 75,000 kw. of electric energy, about 90 per cent. of which is consumed in twelve calcium carbide furnaces. Ten of these are sufficient for normal operation, leaving two spares. Each is capable of producing 50 tons of carbide per day and the plant as a whole is the largest carbide installation in the world.

Fig. 2 shows the line of air compressors and to the right of them the air liquefying and distilling columns furnishing the pure nitrogen which is combined with the ground calcium carbide in the ovens. There are 1,536 ovens in all, each good for half a ton of cyanamide per day. The reaction is started by an electrically heated carbon rod in the centre of the oven. The current is then turned off and the reaction proceeds to completion on the heat it develops in from 24 to 40 hours.

During the reaction the material sinters into a solid ingot, which is next crushed to a fine powder and hydrated with water sprays to destroy any unaltered carbide. If it is to be used direct as fertiliser, oil as well as water sprays is used to reduce the dustiness of the product. Plant No. 2 was designed, however, to convert the whole of its cyanamide into ammonia. This is done in 56 autoclaves. These are 21 ft. high, 6 ft. in diameter, and have a wall thickness of 1¼ in., being built to operate at a pressure of 300 lb. per square inch. In these the cyanamide reacts with water to form ammonia and calcium carbonate. For fertiliser purposes this ammonia would normally be neutralised with sulphuric acid to give the ammonium sulphate of commerce, but for war time uses at least a large part of it was wanted as

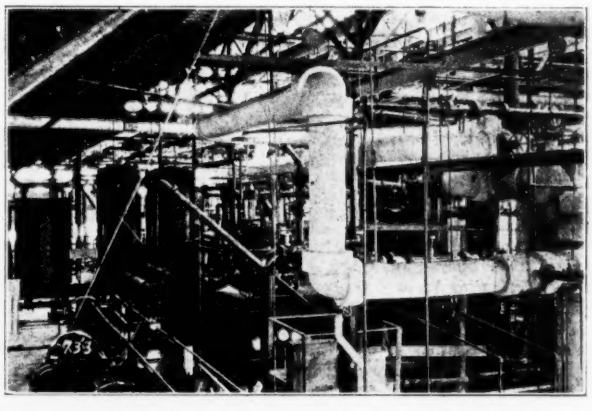

FIG. 4. ONE CORNER OF THE "PROCESS BUILDING" OF NITRATE PLANT NO. 1.

nitric acid, so it was mixed with air and passed through electrically heated platinum wire gauze stretched horizontally

across the aluminium boxes shown in Fig. 3. The oxides of nitrogen thus formed were finally absorbed in water, trickling down in immense vertical towers to form nitric acid. The two rows each of 29 oxidisers seen in Fig. 3 are only one-twelfth of the total number at Plant No. 2, each oxidiser requiring five and two-tenths ounces of platinum wire mesh.

This gives some idea of the type and magnitude of the cyanamide plant, which, as a whole, including the steam power plant and the village for housing the employees, cost the Government approximately $66,500,000.

### The Direct Process

Nitrate Plant No. 1, located at Sheffield, three miles from No. 2, and embodying the direct synthetic ammonia process, was designed for only one-fifth the capacity of No. 2, and of this capacity only about one quarter was completed to a point where tests could be run on it before work was finally discontinued after the armistice. Fig. 4 is a glimpse of one corner of the "Process Building" in this plant and gives some idea of the complexity of design. Up to this time about $13,000,000 had been spent on this project, as a whole, including the industrial village, the steam power plant, and the oxidation plant for turning the ammonia into nitric acid, but in the final report of the Ordnance Department it is stated that "the total cost chargeable to the manufacture of ammonia at United States Nitrate Plant No. 1 would have been approximately $8,000,000 to complete the plant in a most substantial manner to a capacity of 11,000 tons of ammonia per year. This figure represents an estimate of the cost under emergency conditions, and may be reduced to almost half of that amount to represent pre-war costs. Thus the pre-war cost per annual ton of ammonia in this country would have been about $400." Subsequent developments have still further reduced these construction costs in so far as new plants are concerned. Just how much of the present Plant No. 1 equipment it would pay to remodel and use, should it be determined to build a direct synthetic ammonia plant at Muscle Shoals, is problematical.

### Comparison of Costs

For convenience of discussion, we may divide the plant into the equipment for producing the elementary gas mixture of nitrogen and hydrogen and that concerned with bringing about the chemical combination of these gases. This latter part, including the high pressure gas compressors, final gas purification, catalytic bombs, ammonia removal system, and gas recirculating pumps is very nearly the same, no matter how the elementary gas mixture is obtained. In the larger plants, at least, it is believed that it should now be possible to keep the construction cost of this part well within $100 per annual ton of nitrogen fixed. If the gases are to be generated by electrolysis of water the electrolytic cells and accessories, including housing and gasometers, would cost about as much more, making the total present cost of such a plant about half of the pre-war cost for the Sheffield plant as above estimated by the Ordnance Department. If, instead of using electrolytic hydrogen, gas producers were installed, the cost per annual ton might be increased by between $50 and $100, depending very largely on the size of the plant. In electrolytic plants the unit cost decreases much more slowly with increase in size of plant than in gas producer plants. It also seems probable that there is a larger margin still left for cutting costs in the producer system than in the electrolytic as regards both installation and, more particularly, operation. Some 60 per cent. of the cost of nitrogen fixation by the synthetic ammonia process is in the cost of the pure hydrogen required by the process, and this undoubtedly represents the part of the process where the greatest future economies are to be looked for.

In producing the hydrogen for fixing one ton of nitrogen the one system consumes approximately 13,500 kw. hrs. of electrical energy, and the other two and a half tons of coke and seven tons of steam, but the other supplies, labour and up-keep, would probably be somewhat higher in the gas producer system. If merely as a rough guide we compare the cost of electrical energy with that of coke and steam, taking these latter at six dollars and eighty-five cents. per ton respectively, which represented conditions at Sheffield, this would be equivalent to electrical energy at one and one-half mills. (·15 cents.) per kw. hr. A figure of two mills. (·2 cents.) per kw. hr. has been practically the bottom rate discussed for primary power at Muscle Shoals, and this is far lower than anywhere else obtainable in this country.

The above must not be taken as a strict comparison of total costs by the two processes, but should at least serve to make us temper, with some hard common sense, our views on the probable relation of nitrogen fixation to hydro-electric power in the years to come. We should remember that what finally determines the real value of electric power at any given point is the demand and the possibility of supply from other sources.

It may be that with outlets and prices for electric power existing at the time of completion of the Wilson Dam, nitrogen can be fixed with the aid of electric power cheaper than by the use of coke and coal, but the inevitable drift of economic and technical development will be away from this situation, and before we postulate our whole plan of action on such a situation we should carefully consider its probable duration, and the necessary readjustments which changing conditions will later almost certainly make desirable.

The situation here presented is in fact typical of most electro-chemical industries. They present excellent loads on which to start off a new hydro-electric project, especially in an isolated district far from diversified power markets, but as these power markets build up around the power plant, as they inevitably will, largely from the stimulation of the power itself, it is usually to the public interest that the power should be released to these more intensive and diversified uses. The best proof of this being in the public interest is the fact that these uses can afford to pay a higher price in the open competitive market, which, after all, is the public's own and automatic way of expressing its judgment of relative values. As these heavy chemical or metallurgical industries are displaced, they must either move on to new and more isolated water powers or, as in the present case, what is much better, find new ways of accomplishing the old results which do not demand tying up so much electric power.

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### Technical Press and Information Bureaux

In an address on the "Technical Press as an Agency for Collecting and Abstracting Information" before the Conference on Bureaux of Information and Special Libraries at Hoddesdon on Sunday, September 7, Mr. F. H. Masters, editor of *The Electrician*, said that the Press was not a producer of original information but a machine that worked for good or ill on material that someone else had produced. Most scientific and technical workers were specialists and most journals were general in their scope. The editor must, therefore, keep his outlook broad, and, if he was in any degree successful in doing this, he should be able to indicate to the specialist on what subject and in what way he should write. In other words, an editor's business was not only to collect information but to suggest subjects for treatment and to see that they were treated in a way which experience showed was of the greatest possible use.

The habit had grown up of writing articles which not only dealt with the author's own work but which summarised everything that had led up to the particular point dealt with. Such articles were both too long and too uninteresting for any editor to publish. Past work should be dealt with by reference rather than descriptively, and a bibliography was essential for every original technical article. Rigid sub-editing would increase the value of most articles, and if the author himself shrunk from infanticide he should get some friend to do the foul deed for him. No technical paper that was run as a business could, however, depend entirely on original articles. It must have an efficient news service and must keep its readers informed thereby of what was going on over as large an area as possible. The collection, treatment, and publication of news, using the word in the broadest sense of the term, were the most important functions that any journal could perform. If a journal could obtain and maintain a reputation for always having something that no other journal had it would have gone far on the road to success.

Mr. Masters also dealt with the value of bureaux of information for answering inquiries. A technical journal should be a clearing house of information, and the more nearly it approached to that ideal the more nearly it would achieve success.

# Developing Our Dyestuffs Industry

## The Story of Hickson and Partners, Ltd.

THE quiet way in which the dyestuffs industry of Great Britain is being developed by firms of moderate size is well illustrated in the case of Hickson and Partners, Ltd., a short history of whose enterprise has just reached us.

The firm's chemical works in Ings Lane, Castleford, were

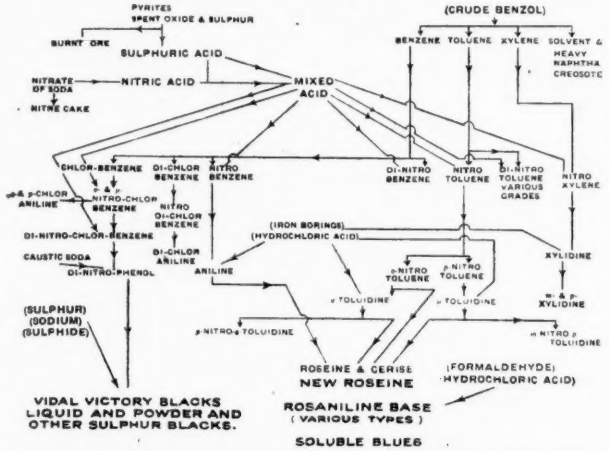



FIG. 1. FLOW SHEET ILLUSTRATING THE SEQUENCE OF OPERATIONS AT ALL STAGES OF MANUFACTURE.

erected in 1915-16 at the instigation of the Director of Contracts of H.M. War Office for the purpose of manufacturing T.N.T. The founder of the company, Mr. Ernest Hickson, of Bradford, had previously owned chemical works at Wakefield, but these were not adequate for the output required, and a new site was found on the banks of the River Aire just below its junction with the Calder, giving a frontage for quays of some 650 ft. and offering facilities for splendid railway sidings direct on to the London and North Eastern Railway from its Castleford Station. The first sod was cut on January 22, 1915, and building was pushed on with such speed that a first delivery of finished T.N.T. was made on July 13 of that year.

The founder of the company had been intimately connected with the aniline colour trade since the earliest days, being with the first large makers of aniline dyes in the world, Brooke, Simpson and Spiller, Ltd., of Hackney Wick, London, since 1877, and the new works was so designed at its inception that it could be eventually converted into a self-contained colour factory, capable of making its own intermediates and dyes, and only dependent on other sources for crude basic

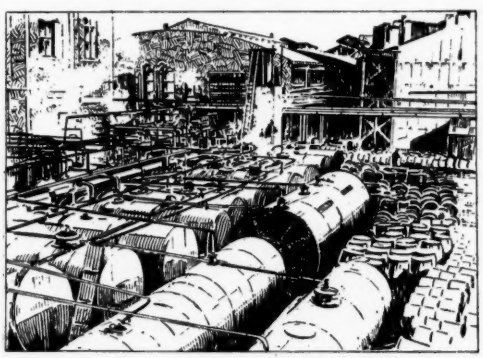


FIG. 2. STORAGE TANKS FOR BENZOL, TOLUOL, AND INTERMEDIATE FRACTION.

raw materials, such as sulphur, crude benzol, etc. For this purpose, after it had been found impossible during the circumstances prevailing in 1915 to rush up an oleum plant quickly, a large sulphuric acid chamber plant—believed to be the largest unit of its kind in the United Kingdom—was erected to a modified Belgian design. Sulphuric acid is of course one of the most important raw materials used in the works, and being able to make this on site and to pipe it to the various departments using large quantities places the company on an exceptionally strong economic basis. A large plant for nitric acid was added and another for the rectification by fractional distillation of coke oven benzol. By this means all the essential raw materials required at that time were produced in the works.

When the war ended, the plant was gradually turned over for the manufacture of intermediates, chiefly nitro and amido derivatives of benzene, toluene and xylene and the further working up of some of these products into more complicated compounds, and some finally into dyes. A speciality has been made of nitrobenzene (oil of mirbane), aniline, ortho- and para-toluidine and among dyestuffs sulphur blacks, with the sale and manufacture of which the founder had had a long experience, and magenta and rosaniline base for the production of soluble and alkali blues.

From the commencement of actual manufacture the founder's son, Mr. Bernard Hickson, M.Sc. in Tinctorial Chemistry, a former pupil of Professor Green at Leeds University, joined the company, and the developments of the present works have taken place largely under his supervision. He had the advantage of inspecting practically all the large

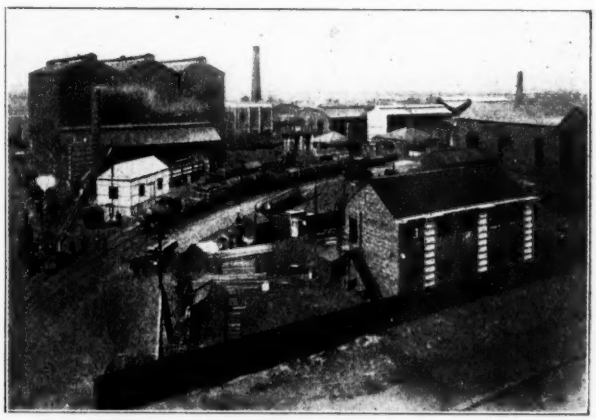


FIG. 3. TRAIN LOAD OF SULPHURIC ACID HAULED BY FIRELESS LOCOMOTIVE FROM WORKS' SIDINGS TO MAIN LINE.

nitrating factories carried on during the war, and of working in some, and as a member of the mission appointed by the Department of Overseas Trade which was sent to Germany in July, 1919, had a unique opportunity of studying the organisation, lay-out, and working of the plant of foreign colour works. In 1920 the board of the company was joined by Mr. Alph. Sharp, C.B.E., late Superintendent of H.M. Factory, Greetland, Halifax, whose experience in chemical manufacture has been of great value to the company. The policy of the firm is to specialise on comparatively few products, all of which are made in the works from crude raw materials, and not to be dependent on other makers for intermediates; also to make these of the utmost purity obtainable in commerce under the supervision of a highly trained scientific staff.

In some notes on the coal tar dyes it is stated that Magenta discovered in 1856, was the first synthetic colour made from coal tar on a commercial scale to come prominently before the public, and as this was in 1859—the year of Napoleon's striking victory at Magenta, in his Austrian Campaign—that name quickly became more familiar for the colour, though the original English patent holders from the start adopted the more rational name of Roseine. Hofmann, who was then working in England, originated from this the name of Rosaniline for the base—one still used in all European languages notwithstanding the use of different names for the dye. The German name Fuchsine derives its name from the fact that a Frenchman named Renard took the first process to Germany and they translated his name to Fuchs and added the "ine."

Of sulphur blacks it is stated that these dyes, which first

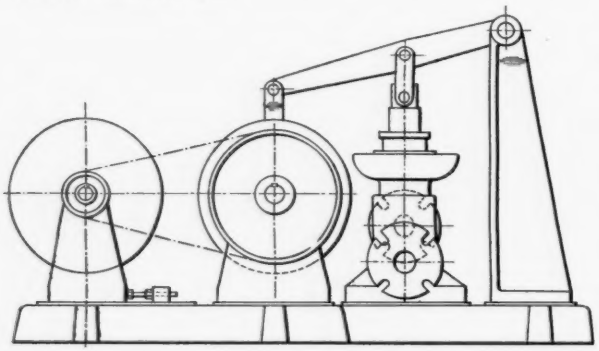
came into the market after their discovery in 1893, form to-day one of the most important groups of coal tar dyes for the dyeing of cotton in all forms, loose, yarn and pieces. Mr. Hickson has been intimately associated with their production and sale since the original discoverer, Mons. R. Vidal, first made them in England, and he was able to secure the patent rights of Mons. Vidal's latest improvements, invented just before the Armistice, in this important range of cotton dyestuffs. The company have placed these on the market under the name of Vidal Victory Black. It is claimed for them that they give, particularly on cotton piece goods and yarn, especially when highly mercerised, a perfect reproduction of high class aniline oil blacks. In addition to the series of sulphur blacks of well-known types the firm have introduced a new series, the latest invention of Mons. R. Vidal. These are placed on the market not only in powder form, but also largely as true liquids, *i.e.*, not pastes.

## Plunger Pump for Acids

### Convenient Unit for Hand or Power Operation

Owing to an increased demand which has recently arisen for a plunger pump for use with acids and acid liquors, Meldrum's, Ltd., of Timperley, have designed an improved form of plunger pump, to force such liquors through filter presses amongst other duties. The pump illustrated is capable of an output of 300 gallons per hour, and has been tested to a pressure of 120 lb. per sq. inch. It has a plunger 2½ in. diam. by 4 in. stroke.

The plunger is operated by a horizontal lever which in turn is driven by a forked connecting rod and disc. All parts of the motion work are brass bushed and have ample lubrication. The disc shaft is driven by chain gearing manufactured by the Coventry Chain Co., giving a reduction of three to one. The shaft carrying the pinion is provided with fast and loose pulleys 12 in. by 2¾ in.



The parts in contact with the acid such as the barrel, plunger suction and delivery valves are made of "Meldrum" acid-resisting metal, which is well known as resistant to most of the usual acids used in the chemical industry. A large acid catcher is provided round the plunger with a separate pipe connection to lead acid which may be forced through the gland, back to the source of supply. These pumps are built in a variety of sizes and for varying duties.

Enclosed relief valves can be provided in the "Meldrum" acid-resisting metal to prevent an excessive rise of pressure due to stoppage in the delivery pipes.

The pump is also supplied as a hand pump operated by the horizontal lever for intermittent work such as emptying carboys and raising acid on to higher floors, etc.

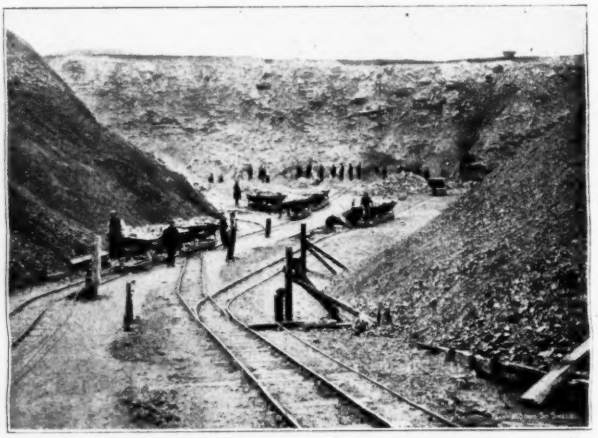
## Latvian Alcohol Exports

The Weekly Bulletin of the Consulate-General of the Republic of Latvia states that the potato crop this year has been abundant, and it is anticipated that alcohol will be produced therefrom in quantities sufficient not only to meet home consumption but to allow a margin for export. These prospects are enhanced partly by reason of the restrictions imposed on the export of alcohol from a neighbouring country and partly by the fact that the potato crops in certain other adjacent alcohol-producing countries have not this year been so good as in Latvia.

## A British Magnesia Works

### Chemical Industry's Dependence on Minerals

A flourishing chemical industry directly based on mineral wealth is to be found in the production of magnesium compounds from the dolomitic deposits in the North of England near Newcastle-on-Tyne. The company working this deposit is the Washington Chemical Co., which was founded in 1840



A Face in one of the Dolomite Quarries.

by the late Mr. Hugh Lee Pattinson, F.R.S., the patentee of the process for making "Pattinson's Magnesia," in conjunction with the late Mr. R. S. Newall, F.R.S. Since that time the works have steadily increased in size to meet the growing demand for the company's various products. It is to-day actually the largest magnesia producing plant in Europe, the works property extending over an area of 50 acres.

The term "magnesia" or "magnesium oxide" is often very wrongly applied and may refer to many and varied forms of carbonate or oxide of magnesium, such as ground magnesite, magnesia carbonate manufactured from various waste products or from magnesite broken down by quasi-chemical methods. The two latter methods of manufacture yield a product necessarily contaminated with various impurities and of a high specific gravity lacking in uniformity. Then again, the term "magnesia" is more correctly applied to calcined magnesite or the products obtained from various commercial carbonates, but these are often uncertain in their composition.

The various forms of "Pattinson's Magnesia" produced at the Washington works are of definite chemical composition. The constitution of the "light carbonate" is that of a basic carbonate $3MgCO_3 . Mg(OH)_2 . 4H_2O$. It has an apparent specific gravity of 0·11 to 0·12 and a very fine state of division, 99·9 per cent. passing through a sieve having 200 meshes per linear inch (40,000 meshes per square inch) and the actual average size of a particle is about 1 micron (1,000th part of a millimetre). The powder never contains more than 1 per cent. of moisture when packed. "Pattinson's calcined magnesia," which is virtually pure magnesium oxide (MgO), is produced by heating the carbonate in specially constructed retorts. The process of dissociation is carried out isolated from contact with the products of combustion or foreign matter of any description. The reaction brought about by the heat treatment is the liberation of the carbon dioxide and the water of constitution. The apparent specific gravity of this powder is 0·10 to 0·12 and its state of division is similar to that of the carbonate.

"Fluid magnesia" is a form for which there is a considerable demand, and this consists of a solution of bicarbonate of magnesia in water containing an excess of carbon dioxide. Crystallization of the fluid occurs after a bottle has been opened due to loss of this excess of carbon dioxide and the precipitation of an insoluble highly hydrated bicarbonate of magnesia.

The illustration reproduced herewith shows one of the quarries owned by the company where the magnesian brinestone is obtained and worked up on the spot for the pure products.

# British Empire Exhibition: Chemical Notes

## Increasing Number of Visitors and Additional Attractions

A VISIT to Wembley after an interval of several weeks shows that the Exhibition has gained rather than lost in popularity. The number of visitors shown by official figures has decidedly increased; and though the reduced price of admission in the evenings and the popularity of the Military Tattoo may be partly responsible for this, the general impression in the grounds during the day is that the numbers present are now as great as or greater than they have ever been.

### Use of the Chemical Section

The Chemical Section is not so crowded as some, partly because it is much more spacious than most, but mainly, of course, because it is much more limited in its appeal to the general public. From the business point of view, it is now possible to form some idea of the results of the exhibition. So far as the chemical exhibitors are concerned, the position seems to range from brisk sales business to simple publicity without immediate return in view. Where a firm has anything that can be bought by the general public, such as soap or scent, a continuous sale has been carried on, but the dyestuff makers and the fine and heavy chemical manufacturers could not hope for anything of this kind. In some cases actual business has resulted; more usually, however, there have been no orders booked, but a number of inquiries made.

This is, of course, only to be expected. Wembley is so largely a holiday resort that it is not to be expected that visitors there would intend to lay out a hundred, a thousand or more pounds on big orders. Afterwards, during the winter, next year, or in ten years' time, perhaps, some of the many visitors may require heavy chemicals, or a plant, or something else which will remind them of the exhibits at Wembley; then those firms which have impressed their names and products on the visitor's mind will secure the order.

### Artificial Silk Exhibits

Considerable attention has been given in the Press recently to artificial silk, and at Wembley two exhibits of considerable interest, as showing how this product has developed, may be seen. One of these is a display of fine garments and fabrics of "Celanese," the cellulose-acetate silk made by British Celanese, Ltd. This exhibit is to be found in the Palace of Industry by going through the Rubber Section, near the Chemical Section. The wonderful range of rich colours displayed is an excellent tribute to the progress made by British dyestuff chemists in producing dyes for this admittedly difficult fabric.

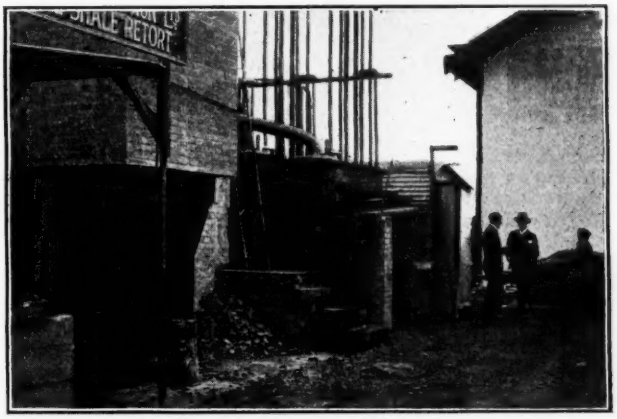
The other great artificial silk exhibit is in the Silk Section, behind the Gas exhibit. The fabrics here are again too bewildering for the masculine mind to attempt description, but it is amazing to remember that a greater or less proportion of each is composed of artificial silk made by Courtauld's viscose process. As is well known, this process has now been used for nearly twenty years, and consists in treating wood pulp or similar material with caustic soda and carbon bisulphide. When the resulting mass is forced into fibrous form it is capable of taking ordinary direct cotton and silk dyes and will withstand prolonged boiling with alkalis. A magnificently produced souvenir booklet has been issued by this firm entitled "The Lure of Silk," which contains on almost every other page a coloured illustration of a lady's gown or other "creation," which most effectively suggests the actual materials. Last week the employees of Courtauld's, Ltd., paid a visit to Wembley, and many were interested to see the finished results of the work in which they were engaged, after it had been through the hands of the dyer and the textile manufacturer.

### Oil Shale Retorting Plant

One of the more recent exhibits at Wembley which was added some time after the exhibition opened is the shale oil retorting plant behind the Burma Pavilion. It is not difficult to find, but owing to the crowds which seem to collect continually in this part of the exhibition to see the Burmese elephants it requires some patience actually to reach it. The retorting plant at Wembley is in no way a "fake" exhibit, but it has been actively working on Burmese oil shale at the rate of some 14 tons per day. The plant has a nominal capacity of 10 up to 25 tons daily. On the occasion of our visit Tasmanian oil shale was being experimentally retorted. The company operating the plant is Mineral Oils Extraction, Ltd., operating the Crozier retort and condenser patents. The retort is of cast iron and contains five tiers of flues. The Wembley plant is only a small one; the depth can be doubled if necessary to increase the capacity, and the length extended indefinitely if required for large size plants. The broken shale is fed in at the top and the residue removed at the base by a screw conveyor. Firing is entirely by the gaseous fractions of the distillation, which are also used to raise steam in an auxiliary "Cochran" boiler for operating the elevators and other machinery.

The take-off from the retort is at four levels, the highest, of course, containing the lightest fractions. Each take-off leads to a series of condensers for grading the fractions, vertical air-cooled pipes being employed. In a given series of condensers the lightest fractions are led to the series above, and the heaviest added to the series below. The four crude fractions containing a full range from motor spirit through kerosene to lubricating oil and pitch are sent away for refining. Very satisfactory results are being obtained at the Wembley plant, which is an enlarged form of one installed at Rangoon for experimental work on Burmese oil shales.

Our illustration shows something of the general appearance of the plant. The base of the retort, one of the primary condensers, and some of the air-cooled fractionating columns can be clearly distinguished.



OIL SHALE RETORT AT WEMBLEY.

### Another Experimental Plant

Another exhibit at Wembley which is actually being used for experimental work is in the Chemical Section on the Brunner-Mond Stand. This consists of an abrasion machine for testing the hardness of blocks of concrete treated with silicate of soda. As is well known, Brunner Mond and Co. recommend the painting of concrete with their P.84 silicate, which contains a high percentage of silica. Normally part of a block only is painted with the silicate and then demonstrated in the machine, which shows that the untreated portion is much more quickly worn away. The process has given very satisfactory results when applied to concrete roads, an additional advantage being that the time of setting is much reduced. The machine is also used for research into the comparative value of different hardening agents or different methods of application. It is of interest to note that recent work seems to indicate that the hardening effect does not appear to be caused by the formation of calcium silicate, but in the separation of a peculiarly tough, horny form of colloidal silica which separates in the pores of the concrete and binds the mass together.

### Liverpool Civic Week

Visitors to the exhibition interested in the chemical industries should not miss the exhibit by the City of Liverpool in the Civic Hall, which opened on Thursday last and continues until Thursday, September 25. Technical and chemical exhibits form a considerable section of the display.

# Co-operation Between Engineer and Works Chemist

## The Functions of the Laboratory

At a conference of Engineering Societies, held at the British Empire Exhibition, Wembley, on Monday, and organsied by the Society of Engineers (Incorporated), two papers of considerable chemical interest were presented—one on co-operation between the engineer and the works chemist, and the other on the uses and qualities of Ceylon plumbago. The chairman was Mr. A. S. Buckle (Senior Vice-President of the Society of Engineers).

Mr. A. R. Page (of the Birmingham Association of Mechanical Engineers), in the first paper, drew attention to the presidential address of Sir William Ellis to the Iron and Steel Institute this year, in which Sir William had emphasised the need for co-operation between the engineer and the scientific worker. In connection with his remarks on the production of reliable forgings for rotors of certain designs, Sir William had said that this was one of the many instances which made one feel that the close co-operation between the engineer and the metallurgist was absolutely necessary for the satisfactory development of the steel trade. The more they sympathised and understood each other's requirements and difficulties, the greater would be the success of their results. Engineering, as a science, had been in existence much longer than metallurgy, and was, therefore, on a more definite basis; but metallurgy, although making great strides, had not yet reached full manhood, and tolerance on the part of the engineer and realisation of the metallurgists' difficulties were essential for the obtaining of good results.

### The Growth of Laboratory Work

The successful determination of the war was brought about by the development and application of scientific principles, and there was no doubt that the war did, to a tremendous extent, make the nation realise the value of science as it had never been realised before. For that reason all large firms established extensive laboratories, and engaged a staff of highly skilled scientific workers to help them to solve their difficulties, ensure uniformity of products, cheapen and expedite production, etc. Smaller firms, who could not afford their own laboratories, formed joint laboratories, whilst the creation of the research associations of the various branches of industry had done a large amount of good.

The laboratory was usually thought of as a place where scientific experiments were carried out, and where the workers were so engrossed in their labours that they never came down to earth. If there were any works laboratories in which the chemists were so far from the earth they were useless to the engineer. The engineer should realise that the chemist or metallurgist must have scope and be allowed to look into any aspect of manufacture. The scientist was not in the works to find fault with the engineer, but to help to get the job right, or improve the process, whether this improvement meant a more reliable product or a cheaper method. One of the functions of a laboratory was the examination of raw materials. This function, although important, was only one of many, and any laboratory which only turned out routine analyses, by turning a handle, as it were, was not being used to its fullest advantage. The value of an examination of raw material was very great; materials for process work should also be examined, as also should fuel of all forms—coal, oil or gas.

The greatest value, however, which could accrue from a laboratory and its scientific staff was in the consideration of processes and methods of production. This was where co-operation between the engineer and the works chemist was absolutely necessary. Industry was "science applied," and consequently the engineer would do well to consult the scientific worker. Most process work was based strictly on chemical, physical, or metallurgical principles, as, for example, the electro-deposition of metals, boiler efficiency, furnace efficiency, enamelling, painting, and even lubrication and cutting efficiency. The metallurgist should be allowed to co-operate very closely indeed with the hardening department, and should be in close touch with the tool problem and general mechanical appliances. The measurement of temperature alone was a problem on its own and was very important in many processes, and the works chemist should be made responsible for the upkeep of the pyrometric installations.

### Interchange of Views

The engineer also should give the metallurgist the opportunity of discussing specifications and designs, because he would obtain valuable knowledge and data as to the best materials to use for the various components. In this way the metallurgist, being in close touch with the material specifications, could advise as to the most suitable heat treatment and other process work.

A further function of the laboratory should be investigation into more efficient processes. These, of course, could not be developed in a day, and consequently the engineer must be endowed with that important virtue patience.

The author said he did not intend to find fault with the engineer only, because the works chemist also had his faults. He should realise that, after all, the laboratory was there for the benefit of the works, and he must, therefore, be prepared to give all the information he could to the engineer. This, unfortunately, was not done in many works. The exchange of information should certainly be mutual, and where the works chemist had a problem to solve he should be supplied with all the data necessary, however trivial, because it might be a trivial point which was the key to the trouble. The works chemist must also realise that if trouble did crop up, he had to deal with it quickly, because the manufacturing programme could not be held up for days or weeks while he was solving the problem to his own satisfaction. Something must be done, even though only temporarily, to enable the works to carry on, so that in the meantime the problem could be completely solved.

In conclusion, the author quoted the following from a paper on this subject presented to the Institute of Metals in 1918 by Mr. F. C. A. H. Lantsberry :—

"It is not overstepping the mark to say that the future industrial prosperity and commercial supremacy of our whole Empire depends to a very large extent upon the application of science to industry, but, nevertheless, it is a somewhat appalling thought that only the shock of the most disastrous war which has ever stemmed the tide of civilization could bring home to industry the desirability of a closer union with science."

### Discussion

Mr. James Finney (President of the Birmingham Association of Engineers) said that unless the material going through engineering shops was absolutely correct to specification we could not have successful mass production. There might be difficulties in connection with the qualities of the metal used, and here the chemist came into his own; however conservative the engineer might be, he must bow down to the chemist when there was trouble of that description.

Mr. S. G. Martlew said he had had experience of the value of co-operation between the engineer and the chemist. In a large production concern with which he was connected he had found that there was a fair amount of corrosion and scale formation going on in the boilers, which rendered more costly the production of steam. After investigating, he made various suggestion to the central laboratory of the firm, where they had a staff of chemists. He co-operated with them, and, as the result of experiments, they discovered the source of the corrosion and scale formation. At that time they were faced with very severe Continental competition, and the one thing necessary to enable them to maintain their ground was to reduce production cost. At the bottom of it was the cost of power, and the cost of so treating the water that it could be used advantageously. Another instance was in connection with refractories used for the lining of gas producers and retorts. Co-operation between the works engineer and the chemist had enabled them to tell the manufacturers what refractories were wanted, and thus they had got over the difficulties previously experienced as the result of corrosion.

Mr. Page, in reply to the discussion, said that a works laboratory was not a luxury. It certainly cost a lot of money, and it was difficult to put down in figures what it was worth. The upkeep of the laboratory with which he was concerned probably cost the firm £10,000 a year, but one improvement which was effected last year had saved the firm £10,000. Thus they had got their money back on that one particular improvement, which was one of many.

# Ceylon Plumbago: Its Uses and Qualities

In a paper on this subject, Mr. T. G. Hunter discussed "The Mining and Uses of Ceylon plumbago." The deposits, he said, of crystalline plumbago which were of greatest commercial importance were vein-like in form, and had apparently been deposited along fractures in the rocks. Foremost among these, in size and importance, were the famous Ceylon deposits. Although these were mentioned in print as early as 1681, it was not until 1834 that the industry assumed any commercial importance. As a result of the growth of metallurgical industries, and increasing demand for refractory materials, the industry developed rapidly.

The average annual export of plumbago from Ceylon for the years 1909 to 1919, was 24,404 tons, the export value for all grades being £23 per ton, at Colombo, the port of shipment. A maximum of 668,216 cwts. was exported in 1916, and during the years 1916 and 1917 as much as £100 per ton was realised for some of the best grades of lumps. The latest returns showed that 213,383 cwts. were exported during 1923. The industry had been subjected to periodic depressions and inflations, the most prosperous periods coinciding with war times. The present is probably the worst depression it has ever had to experience.

### Treating the Ore

The ore, as it came from the mine, might contain as much as 50 per cent. of impurities, mostly in the form of quartz, etc. Except at a few places, where the plumbago was prepared entirely at the mine, the ore was picked over to reduce the impurities as far as possible by pit curing, and was then packed into barrels and transported to Colombo or Galle, where it was finally prepared for shipment.

In the methods of curing there was some diversity, but a description, which might be taken as typical, given by Mr. S. S. Sedgwick in a pamphlet on "The Plumbago Industry," stated that the ore was taken on to barbacues or sloping floors and washed in water to remove earth and other foreign substances, and then spread out to dry. It was then taken to sheds, where it was sorted, by hand, according to quality. By means of a combined hammer and axe, the good pieces were chipped to give them shape and appearance, whilst any pieces likely to contain silica or other impurities were smashed with the hammer and put on one side for further treatment. The large lumps were polished by brushes, and the ordinary lumps either by rubbing them by hand on a gunny bag or by swinging them in a gunny cloth. The residue from the lumps was sifted to obtain chips, dust and flying dust. To insure the chips being flaky, it was passed over a felt screen standing at an angle of approximately 60°, and the flakes adhered to the felt, whilst the round pieces rolled down to the floor. The residue was smashed again, either by wooden mallets or by passing it through a rolling machine, and then winnowed to eliminate, as far as possible, the remaining grit. The plumbago, after winnowing, was sized again to separate the dust from the flying dust. The mineral for export was sized into large lumps, ordinary lumps, chips, dust, and flying dust, and packed into barrels of hora wood, each containing approximately 6 cwts. It was graded into qualities familiarly known as X, XB, B, BE, and P.

In some establishments the impure grades were washed in a tub or pit. In this process the mineral was placed in baskets, and by a circular "panning" motion of the immersed baskets the plumbago particles were thrown off into the pit, while the heavier impurities, especially pyrites, remained behind. To separate the very fine material the powdered plumbago was placed in a basket having somewhat the shape of a large dustpan. The contents of the basket were thrown into the air, and the heavier particles fell back into the basket, while the finer material was blown forward and fell on the floor. Finally, various grades coming from several mines, or differing in size or texture, were blended to meet the requirements of purchasers.

The industrial application of plumbago was determined by its purity and physical character. Its purity could be tested by analysis for carbon and the containing impurities; the physical properties could not be determined so easily, however, by particular rules, and skill and long experience was required to judge these.

### Some Industrial Uses

Some of the uses for which plumbago was essential were the making of crucibles, lubricants, polishing, pencils, foundry facings, and for electrical purposes. The fact that plumbago was nearly pure carbon, was relatively inert chemically, and volatilised only at high temperatures, made it of value in the manufacture of crucibles for use in the steel, brass, and bronze industries. Such crucibles must have good tensile strength, and the poorer the binding quality of the plumbago used, the larger the quantity of less refractory binding material must be added to hold the mass together, thus increasing the more fusible constituents of the crucible at the expense of the more refractory and materially decreasing its life. For this reason a fibrous or flaky plumbago was used for the interlocking of the flakes or fibres added to the tensile strength, and the Ceylon product was claimed to be undoubtedly the very best material for this purpose.

Crucibles were being made with a material containing proportions of other than Ceylon plumbago, but it might be seriously questioned whether any good crucibles were being made entirely without Ceylon plumbago, and it was probable that the higher the percentage of the Ceylon product used in the mixture, the more efficient the crucible produced. This was found to be the case in the U.S.A., where experiments were made to try to introduce their flake graphite into crucible making, but it was considered inadvisable to go beyond 10 per cent. of this material, as anything more seriously affected the efficiency of the crucible. The Ceylon variety was more cubical in form, and carried a greater surface area in proportion to its volume. Other varieties gathered and held air and did not resist pressure to the same extent, nor were they so easy to press into a form without an excessive amount of binder. It had been stated in America that, in order to maintain the standard of efficiency in the plumbago crucible, it would be necessary to use the Ceylon product, whatever tariff was imposed on it. It might be said that Ceylon plumbago was superior to all others for crucible making, and also for the manufacture of other refractory products, such as muffles, stirring rods, dipping cups, skimmers, and nozzles.

As to the use of plumbago for lubricating purposes, its addition to oil resulted in a lower frictional resistance; the quantity of oil was reduced, and a lighter grade might be employed. The amount of plumbago required was small, yet the benefits derived from its use persisted long after the application had ceased.

Ceylon plumbago, it was claimed, was most suitable for the manufacture of foundry facings, on account of its physical structure. The chief claim was that it possessed a larger covering surface than any other plumbago, and facings made with it stuck to the face of the mould. Other varieties, owing to their light, fluffy, flaky structure, would not stick, and when the iron was poured into the mould it picked up the light thin flakes and the flow of the iron washed the plumbago off the face of the mould, the metal touched the sand, which was fused and burned fast to the iron, and the casting was either spoiled or required hours of cleaning.

With regard to its use for electric brushes, its physical structure was such that, when powdered, it produced thicker, heavier nodular particles than other varieties, and gave a denser brush, with higher electric conductivity, than a brush made from thin flake, as this latter held air tenaciously, packed and moulded badly, and deformed when pressed into shape.

### Future of the Industry

Owing to the lack of demand, the Ceylon plumbago industry is still in a depressed condition and production is at a very low ebb. Should the conditions again become favourable, it was estimated that Ceylon would be able to produce something like 30,000 tons annually for a good many years to come. Though Ceylon stocks are not yet exhausted, there was reason to believe that Madagascar had reached the stage at which they would have to depend on freshly-mined product, which they would probably not be able to place on the market at the same low price that had ruled for some time past. It is confidently expected that, with Madagascar not being in a position to underquote to any great extent, Ceylon plumbago would again be in demand.

Some of the Ceylon firms are now endeavouring to grind and refine their plumbago in Ceylon, in the hope that such a product will be found to meet the requirements of the trade.

Dr. C. A. Hewavitarne (Commissioner for Ceylon) said that Ceylon was the only British possession which produced crystalline plumbago. The product was an Imperial asset, and it looked as though we were going to lose it very shortly; unless England helped Ceylon it might be found that within the next three or four years the industry might disappear from Ceylon, and from the Empire.

Mr. S. Oxton Jones said that the producers of plumbago in Madagascar were able to cut prices because the franc was at such a low ebb. If the value of the franc were normal (25 to the £) the price of the Madagascar product would be 200 per cent. above that of the Ceylon plumbago. It was Ceylon plumbago, he said, that had won the war.

Mr. S. G. Martlew said he had used plumbago, but had not specified the kind—though he would know what to do in the future when ordering it for lubricating purposes, more particularly in connection with the running of chains for the transmission of power.

### Samples of Bentonite

A CORRESPONDENT writes: "I shall be pleased to know where a specimen of bentonite, presumably from the Wyoming deposit, can be obtained. Frequent mention of its properties and use has appeared in THE CHEMICAL AGE, but inquiries have so far been without result."

We understand that the Imperial Mineral Resources Bureau, 2, Queen Anne's Gate Buildings, Dartmouth Street, Westminster, London, S.W.1, recently received from the Mines Branch of the Department of Mines of Canada a shipment of 5 tons of Alberta bentonite for research purposes and for distribution in British industries. The Secretary of the Bureau authorises us to say that samples of bentonite may be obtained on application to him. In the case of our correspondent the Bureau has already forwarded a one pound sample.

### Industrial Chemistry Fellowships

THE following awards for the year 1924-25 have been made by the Salters' Institute of Industrial Chemistry and approved by the Court of the Company:—

Fellowships are renewed to Dr. W. G. Sedgwick, Armstrong College, Newcastle-on-Tyne, and Oxford, Fellow, 1923-24, and to Mr. W. Randerson, Imperial College of Science and Technology, Fellow, 1922-23, and Hon. Fellow, 1923-24 (during tenure of Albert Kahn Travelling Fellowship).

Fellowships are awarded to Mr. H. H. Evers, University of Liverpool; Mr. K. Knight Law, University College, Nottingham; Mr. H. S. Pink, University College, Nottingham and Oxford; and Mr. V. E. Yarsley, Birmingham University.

The Salters' Institute has also awarded 72 grants-in-aid to young men and women, employed in chemical works in and near London, to facilitate their further studies.

### Chemical Company's Bankruptcy

THE first meeting of the creditors of Ralph Pearson, trading as the Alpha Chemical and Finishing Co., Rutland Street Works, Middleton, Lancashire, cloth stiffener and finisher, was held on September 15 at the Official Receiver's Offices, Byrom Street, Manchester, when it was stated that the debtor had died on the previous Saturday. There were not sufficient creditors present to form a quorum, and the meeting was therefore adjourned.

## Chemical Trade Returns for August

### Imports Increase but Exports Decrease

THE value of chemicals, dyes, drugs and colours shown in the official returns as imported during August was £1,270,992, which represents a decrease of £44,833 on last year's figure and an increase of £124,582 over the July figure. Exports totalled £2,015,404 under the same head, being £370,461 over the value in August, 1923, but £192,053 lower than the figure for July of this year.

Increases in imports are noted in the case of bleaching materials, barytes, white lead and painters' materials. A noticeable decrease is in sodium nitrate. Exports show the principal increases in the case of sulphuric acid, sulphate of ammonia, tar oil and creosote oil, sodium compounds, and painters' chemicals and materials.

### Imports for August

INCREASES.

| | | 1924 | 1923 |
|---|---|---|---|
| Acid, acetic | tons | 737 | 316 |
| Acid, tartaric, etc. | cwt. | 3,861 | 1,237 |
| Bleaching materials | ,, | 7,519 | 1,290 |
| Calcium carbide | ,, | 55,647 | 50,896 |
| Glycerin, crude | ,, | 20 | Nil |
| Potassium nitrate | ,, | 7,741 | 6,263 |
| Cream of tartar | ,, | 6,103 | 2,646 |
| Zinc oxide | tons | 820 | 626 |
| Intermediate coal tar products, including aniline oil and salt, and phenyl glycine | cwt. | 22 | Nil |
| Alizarine dyestuffs | ,, | 1,161 | 238 |
| Unspecified coal tar dyestuffs | ,, | 5,400 | 3,928 |
| Barytes, including blanc fixe | ,, | 57,390 | 46,008 |
| White lead | ,, | 15,059 | 11,349 |
| Unspecified painters' colours, etc. | ,, | 64,304 | 56,505 |
| Essential oils, except turpentine | lbs. | 376,094 | 306,731 |
| Turpentine | cwt. | 119,513 | 59,048 |

DECREASES.

| | | | |
|---|---|---|---|
| Borax | cwt. | 3,192 | 4,150 |
| Glycerin, distilled | ,, | 22 | 286 |
| Red lead and orange lead | ,, | 3,533 | 4,785 |
| Nickel oxide | ,, | 3,700 | 7,129 |
| Potassium compounds, except nitrate | ,, | 115,754 | 138,923 |
| Sodium nitrate | ,, | 172,968 | 262,313 |
| Sodium compounds, except nitrate | ,, | 17,279 | 17,517 |
| Synthetic indigo | ,, | Nil | Nil |
| Natural indigo | ,, | 69 | 70 |

### Exports for August

INCREASES.

| | | | |
|---|---|---|---|
| Acid, sulphuric | cwt. | 1,480 | 693 |
| Acid, tartaric | ,, | 933 | 706 |
| Ammonium chloride | tons | 298 | 204 |
| Ammonium sulphate | ,, | 23,196 | 17,002 |
| Bleaching powder | cwt. | 34,618 | 12,622 |
| Tar oil, creosote oil, etc. | galls. | 5,233,363 | 2,076,635 |
| Glycerin, distilled | cwt. | 15,177 | 2,922 |
| Potassium nitrate | ,, | 1,650 | 533 |
| Unspecified potassium compounds | ,, | 1,457 | 1,068 |
| Sodium carbonate, etc. | ,, | 534,887 | 411,306 |
| Caustic soda | ,, | 135,035 | 110,042 |
| Sodium sulphate, including saltcake | ,, | 152,901 | 101,846 |
| Zinc oxide | tons | 188 | 53 |
| Dyestuffs, other than coal tar | cwt. | 5,883 | 5,265 |
| Barytes, including blanc fixe | ,, | 8,376 | 427 |
| White lead | ,, | 12,450 | 7,398 |
| Paints, etc., ground in oil or water | ,, | 28,247 | 18,629 |
| Paints, etc. prepared | ,, | 28,663 | 12,612 |
| Unspecified painters' materials | ,, | 44,524 | 41,448 |

DECREASES.

| | | | |
|---|---|---|---|
| Anthracene | cwt. | Nil | Nil |
| Benzol and toluol | galls. | 76,606 | 366,562 |
| Carbolic acid | cwt. | 8,465 | 11,581 |
| Naphtha | galls. | 1,780 | 8,840 |
| Naphthalene | cwt. | 1,660 | 11,168 |
| Unspecified coal tar products | ,, | 30,014 | 34,614 |
| Copper sulphate | tons | 233 | 522 |
| Glycerin, crude | cwt. | 497 | 2,710 |
| Potassium chromate and bichromate | ,, | 1,670 | 3,746 |
| Sodium chromate and bichromate | ,, | 4,181 | 4,811 |
| Unspecified sodium compounds | ,, | 46,250 | 56,522 |
| Coal tar dyestuffs | ,, | 9,054 | 12,830 |

## Absorption of Gases by Liquids

**Papers at Autumn Meeting of American Chemical Society**

A NUMBER of papers dealing with various theoretical and practical aspects of the absorption of gases by liquids were presented at the autumn meeting at Ithaca, of the American Chemical Society before the Division of Industrial and Engineering Chemistry, and these are summarised in the following notes.

### Principles of Gas Absorption

Messrs. W. K. Lewis and W. G. Whitman pointed out that the rate of absorption is generally determined by the rate of diffusion through the gas-liquid boundary separating the two phases. The mechanism is parallel to that of heat transfer and the same equation may be applied to both processes :—

Rate of transfer = rate co-efficient × area × potential gradient.

With gases of low solubility ($O_2$ and $CO_2$ in water for example) diffusion through the surface film of liquid is slow because only small concentration gradients for diffusion can be established. The liquid film resistance is therefore so large that the resistance of the gas film is negligible and the rate is controlled entirely by diffusion through the liquid. With very soluble gases (HCl from air into pure water) the reverse is true—large concentration gradients are possible across the liquid film, its resistance therefore becomes negligibly small, and the rate is controlled by diffusion through the gas to the liquid surface.

Certain methods of securing contact between liquid and gas give very thin liquid films, whereas others tend to disrupt the gas film. These characteristics vitally affect the suitability of different types of equipment for specific purposes.

### Comparative Absorption Rates for Various Gases

Absorption rates for $O_2$, $NH_3$ and HCl into a stirred water surface have been determined by Messrs. W. G. Whitman and D. S. Davis. The results accord with the theory that the rate of absorption for gases of low solubility is controlled by liquid film diffusion, whereas the rates for very soluble gases are limited by diffusion through the gas. From the results with $O_2$ (the least soluble gas) and HCl (the most soluble) it is possible to predict rates for sulphur dioxide and ammonia, which show good agreement with the data. Data were presented showing that the specific rates of escape of sulphur dioxide and ammonia from water are approximately the same as those for absorption. Other experiments showed the effect of speed of stirring and of viscosity of liquid on the rate of deabsorption for sulphur dioxide.

### Absorption of Moderately Soluble Gases

A paper by Mr. H. G. Becker contained data on the absorption of oxygen and nitrogen by water from gas bubbles, and also through the upper surface of a stirred liquid which led to the conclusion that the absorption rate was proportional to the degree of unsaturation. Data on the effects of temperature and of rate of stirring were also included. The rate obtained with a gas bubble was more than double the maximum rate obtained through a stirred liquid surface. In other experiments absorption rates for gases of widely varying solubilities have been determined through a quiescent water surface. These results show that absorption under these conditions is a complex phenomenon, that stratification of the liquid occurs, and that the nature of the gas and its effect on the density, surface tension and viscosity of the water are determining factors.

### The Mechanism of Absorption

Work was carried out on an experimental absorption tower by Messrs. R. T. Haslam, R. L. Hershey and R. H. Kean, the results being analysed with a view to determining the relative magnitude of the gas and liquid film resistances, and the variation of these with temperature and gas velocity. The ranges covered are from 10°C to 50°C and from ·03 to 1·5 ft./sec. respectively, the gases studied being sulphur dioxide and ammonia, with water as the absorbing liquid. The results indicate that under these conditions the liquid film is the limiting factor in the absorption of sulphur dioxide.

### Absorption of Hydrogen Sulphide

A contribution on the practical side was made by Mr. F. W. Sperr, Jnr., in a paper on the absorption of hydrogen sulphide in the purification of coal gas and water gas from hydrogen sulphide which is of great importance to the gas industry. Until recently this was accomplished by dry absorbent material, generally hydrated iron oxide. The use of a dry purification material has a number of practical disadvantages, so that a number of attempts have been made to develop a liquid process. However, until within the last few years, no liquid process had proved a practical success.

A few years ago, The Koppers Co. developed a liquid process for the absorption of hydrogen sulphide which has been very successful. About 25 plants in America are now employing this process, and a number of new installations are being made. This process employs as an absorbing medium a dilute solution of sodium carbonate. The hydrogen sulphide is removed from the soda solution by aeration, thus regenerating the solution, which is used over and over again.

The process can be used for complete purification, but it is usually preferred to remove 85 to 90 per cent. of the hydrogen sulphide by the liquid process, the remainder being taken out in iron oxide catch boxes. Besides removing hydrogen sulphide, the process has been found valuable in removing over 90 per cent. of the hydrocyanic acid, which is an objectionable constituent of coal gas, and which is not satisfacorily removed by dry purification.

## Royal Photographic Society's Exhibition

### Some Technical and Chemical Exhibits

THE sixty-ninth annual exhibition of the Royal Photographic Society, which is now open at 35, Russell Square, London, until October 25, contains one or two exhibits of technical and chemical interest, in addition to the display of pictorial exhibits, which are something of an eye-opener to those unfamiliar with the modern developments in artistic photography.

Ilford, Ltd., show in two glass cases a series of samples of the chemicals used in the preparation of modern photographic plates. The exhibit includes gelatin, silver nitrate, bromides, and samples of different kinds of sensitive emulsion. Phenol for sterilising and chrome alum for hardening the film are shown, and there are also samples of the Sensitol dyes used in preparing Ilford panchromatic plates. Adjacent are photographs showing emulsion-coating apparatus, and a comprehensive series of light-filters for various purposes. These are arranged with a source of light behind and small direct spectrometer in front, so that the composition of the transmitted light may be seen.

A device of interest to calico printers and others interested in the printing of coloured designs, is the Mutochrome, which is manufactured by A. Hilger, Ltd., for the Chromoscope Co., Walmar House, Regent Street, London. By means of an arrangement of lenses and coloured light-filters it is possible to project any given design on a screen and alter separately either the colours composing it or their intensities until a satisfactory appearance is obtained.

Dr. William R. Amberson shows a series of photographs used in determining the effect of stirring, enzyme concentration, substrate concentration, and temperature on the reaction velocity associated with the decay of luminescence in a small Japanese crustacean. This is a peculiar case where the luminescence is an indication of chemical state and thus renders the phenomena amenable to photographic investigation. A number of miscroscope photographs on view show the formation of crystals in alloys and metals, and the cooling of rubber containing fillers.

Among the commercial exhibits Johnson and Sons, of 23, Cross Street, Finsbury, the well-known photographic manufacturing chemists, are showing a complete range of chemicals required by photographers, the majority of which are prepared in their Hendon works.

### Cyanite in Refractories and Insulators

THE possibility of obtaining the desirable properties of sillimanite in refractories and high tension electrical insulators by utilising cyanite as the principal body ingredient is to be investigated at the ceramic experiment station of the U.S.A. Bureau of Mines, Columbus, Ohio. A study of the rate of inversions of cyanite to sillimanite and possible means of altering this rate have been started. The cyanite under investigation is a tabled concentrate from a rock which also carries large amounts of quartz and considerable rutile.

## Solvent Recovery Problems

### The Question of Economy in Rubber Proofing

MR. H. L. TERRY, F.I.C., writing in *The Rubber Age* on the subject of solvent recovery states that despite the activities of two or three firms specialising in recovery plants, it cannot be said that this process has yet become at all general in our proofing works. Unwillingness to incur the capital cost may be taken as the main cause of inaction. As regards solvent naphtha it is unfortunate for the makers of recovery plant that the price is so variable. When it is high they point out to the proofers the potential advantages of recovering it, and then before negotiations have come to anything definite demand falls off and the price tumbles, making the recovery proposition look much less attractive. With regard to the general question of recovery in proofing works, there is in many quarters a tendency to regard the matter entirely as concerned with economy in the purchase of solvent; in other words, the proofer asks himself whether the naphtha recovered will cost him less after all working expenses are paid than if he bought fresh solvent in the market. Other considerations, however, have weighed in the case of some of the firms who are operating recovery plant at the present time. To mention the two most important of these considerations, there is the matter of the freedom of the spreading room from naphtha vapour with consequent improved hygienic conditions for the workpeople, and there are those cases where, owing to the works being situated in a residential district—not necessarily high-class—complaints have been made of the naphtha vapours.

It is perhaps not surprising that this consideration has been more potent as regards the installing of recovery plant than the question of the workers' health in those cases where an economic result has not been the prime consideration. No doubt in the majority of cases the proofers' attitude of mind is that a recovery plant must show a profit or he will not have one, and the several plant makers are naturally at pains to convince him that it certainly will pay. Probably it would not lead to business if the plant makers advocated an instalment that had aims other than financial, but the advantages of such plant might be pointed out, also the fact that it need only have a certain efficiency to give satisfaction, and could therefore be erected at a low cost.

### Quality of Recovered Naphtha

With regard to the quality of recovered naphtha, there does not appear to be anything against it except that, owing to the very general loss of its lighter fractions, its distillation range is higher than that of the original solvent. When kept for some months, also, it has a tendency to turn yellow. But then there is no object in storing it, and the former objection can be largely nullified by using a mixture of the recovered with new solvent. Turning again to the matter of economy, this must always depend largely upon the market price of solvent, as when the price is high it may easily turn out that the low recovery simple plant installed on account of hygiene or fear of legal proceedings may prove itself a profitable undertaking.

### Carbon Bisulphide Vapours

Another problem which has sometimes been troublesome in residential neighbourhoods where proofers happen to be located, is the question of the bisulphide of carbon vapours which are generally acknowledged to be most objectionable. All works are not so conveniently situated as to be able to carry on their cold curing at a spot sufficiently far from dwelling houses as to be free from complaints, though it is only in exceptional cases that money payments are necessitated in order to ease the situation. A recovery process is understood to have been worked out and to be in operation at some works but no details are available. For various reasons the case is more complex than that of naphtha fumes, where we are merely concerned with condensation. A certain amount of work done by the writer on the matter, showed that the problem would present less difficulty if one were dealing with bisulphide vapour alone, and not with a mixture of bisulphide and chloride of sulphur vapours. This problem, it appears could be attacked on two main lines, either absorption of the bisulphide vapours in a fluid from which they could be recovered by distillation, or by passing the vapours through some solution whereby the carbon bisulphide was converted into some other body which could be recovered for sale. The matter as a whole would require a knowledge of chemical engineering beyond what is usually available in a proofing works, and it would seem to be the ideal thing to have the proofing works contiguous to a chemical works whose technical staff might by arrangement look after the bisulphide recovery plant. A scheme of procedure on these lines was actually planned in connection with the projected removal of a proofing works to larger premises three or four years ago, but, unfortunately, the scheme did not materialise owing to the slump in trade.

## A New Type of Mechanical Stoker

(FROM A CORRESPONDENT.)

ONE of the first successful mechanical stokers for steam boilers was the chain grate, originally introduced in 1841 by Juckes for use with externally-fired cylindrical boilers and brewers' "coppers." It is sad to relate that many prominent chemists of the time were opposed to the principle on the grounds, entirely erroneous, that it would lead to a high percentage of CO in the flue gases. However, the greatly increasing use of the internally-fired cylindrical boiler, especially of the "Lancashire" type, resulted in the temporary eclipse of the chain grate stoker until the water tube boiler became a practical proposition.

It then blossomed forth again as a new invention and has been more used than any other type of stoker in the world. The design, however, has two inherent defects. In the first place as the layer of burning material travels it gradually becomes thinner, and a very large amount of excess air is apt to pass through the ash layer at the end, so that it is extremely difficult to get good $CO_2$ figures. In the latest types of travelling grate or modified chain grate stoker this drawback has been overcome in one example by substituting the ordinary common chain by a special form of heavy transverse link framework containing a large number of very small firebars, whilst the air is supplied by mechanical forced draught to separate compartments arranged along the side of the grate. In this way the amount of air at different lengths of the stoker can be adjusted with the greatest ease by means of small dampers, so that the average $CO_2$ in the flue gas can be brought up to a high figure without difficulty, and no excess air passes.

The second and more serious defect is that of excessive riddlings because of the use of comparatively heavy cast iron links to prevent burning out, which means a corresponding large air space between each link. Messrs. The Underfeed Stoker Co., Ltd., have, however, just introduced on the market a travelling grate compartmented air supply stoker, the "Underfeed Type C," which is on entirely new lines, and is both claimed to have eliminated riddlings altogether and to render possible the burning of refuse fuels in a fine state of division.

The design is essentially that of a travelling laminated steel belt, that is to say, the links are really thin flat segments of steel only ¼ in. wide, so that the air supply is sub-divided to an extent hitherto regarded as impossible, with the consequence that the fuel does not fall between. The use of very narrow steel links in this way without burning out, the chain really functioning as a laminated belt, quite different to the ordinary chain grate stoker, is rendered possible by the ingenious device of water cooling the whole grate, which hangs down loose underneath, travelling completely submerged in a long water bath, extending the full length of the stoker. This not only cools the links but at the same time acts as a perfect seal for the air supply compartments, quenches the ash and clinker at the end of the travel, and gives sufficient local steam or vapour to prevent the ash becoming semi-molten and forming large clinkers.

Also the drive is by means of a fluted drum which engages every link in the full width of the stoker, and the surface of the grate is not flat as usual, but rises upwards towards the centre of the fire, becomes level for some distance, and then falls again at the back, arranged by means of guide rollers underneath, which gives a thick seal of ash at the end thus acting as a still further method of preventing the passage of excess air.

Finally, by means of the "Detrick" suspended firebrick arch, combined with the use of the fluted driving drum already mentioned, single stoker units can be constructed up to 24 feet in width without difficulty, so that the very largest type of water tube boiler can be fired with one stoker instead of three or four side by side as at present.

## A New Colour-Testing Lamp

### Interesting Device for Colour Makers and Users

AN interesting new type of lamp for testing the fastness of coloured pigments to sunlight has been invented by Lorilleux and Bolton, Ltd., printing ink manufacturers (patent applied for No. 31,713), and is now being manufactured by A. W. Penrose and Co., Ltd. The lamp is intended not only for printers and printing ink makers, but also for the paint trades, dyestuff and textile manufacturers, and all other industries interested in coloured pigments.

Up to the present time, two methods for testing the fastness of colours to sunlight have been employed. The old method, which is still generally used, and consists of exposing material to be tested outside a building in a sunny position for a certain period. This period varies from one to three months and sometimes longer, according to the use to which the material is to be put. This is not only a lengthy process but also very unreliable, especially during the winter months. In many cases materials tried during those months have been found fast to light, but when tested again in the summer months have faded rapidly.

During recent years several types of lamps have been introduced to reduce time of exposure and secure reliability. They have been either gas-filled, mercury vapour or arc, and were certainly an improvement on the old method. The great trouble with lamps of high candle power was the high temperature developed, as some pigments are fast to light but not fast to heat, and the heat emanated, which is of an extremely dry nature, is not consistent with atmospheric conditions. In the gas-filled type of lamp there was also the drawback that after a time the lamps lost their efficiency and had to be tested very often with comparative exposures to sunlight. Some at first were calculated at nine hours' exposure to give a month of bright sunshine, but were found after being in use for about a year to require twenty-two hours to attain the same results; hence the difficulty of standardisation. The object of the makers of the new lamp was to obviate the difficulty of heat, to retain natural atmospheric conditions as nearly as possible, and to evolve constant light.

#### Reproduction of Natural Conditions

They have obtained this result by using an arc lamp of very high candle power, enclosed in a cylinder with a dial thermometer. The material to be exposed is fixed in small frames or windows inserted in the cylinder and air-cooled by a fan of variable speed. There are two main advantages in this method compared with the old one. (1) In using an air-cooled apparatus this lamp will give a temperature which can be regulated from 100° F. to 130° F. (the average temperature in London of very bright sunlight is approximately 110° F.) During the time of testing, the air is circulated through the apparatus by means of an electric fan, and thus the materials exposed are in a natural atmosphere. (2) By using an arc lamp a constant power of light is obtained. The inventors consider that twenty hours' exposure is equivalent to a month of bright sunshine. The cost of running is very moderate, as only two units are used per hour. The lamp, being an arc lamp, can be switched on to the power circuit, for which the price of running is cheaper than for lighting.

It may be mentioned that an exhibition lamp is now on view at the premises of Lorilleux and Bolton, Ltd., 31-34, Cursitor Street, London, E.C.4, and demonstrations will be given to anyone interested.

## Gas Companies Amalgamate

THE Gas Light and Coke Co. announced on Wednesday that a provisional agreement had been entered into for the amalgamation of the undertakings of the Gas Light and Coke Co. and the Brentford Gas Co.

## Oil Separation Tests

AFTER the *Leviathan* had berthed at Southampton on Saturday, the Pirbright Company gave a demonstration of the removal of the oil from the oily ballast water of her tanks by means of their oil-separating plant, which has been fitted in a self-propeller steel lighter, the *J. Taylor Peddie*. The apparatus, the action of which depends on the difference between the specific gravities of water and of oil, is designed to deal with 200 tons of water an hour. About six minutes after the *Leviathan*, which is understood to be burning fuel oil of a heavy type, having a specific gravity of 0·98, had begun to pump the oily water from her tanks into the lighter, clean water was running out of the discharge pipe, and was considered pure enough to be passed directly into the harbour. A subsidiary filtering apparatus is, however, provided in the lighter, by which the water can be purified still further if thought necessary. In tests made earlier in the week with the lighter's plant on oily ballast water from an Admiralty tanker, the oil content in the water direct from the separator was found to be one part in 46,000 on one day and one part in 56,000 on another, while after filtration it did not exceed one part in 1,500,000 on the first day and was nil on the second. The oil itself is recovered sufficiently free from water to be pumped back direct into the ship's bunkers.

By the Oil in Navigable Waters Act of 1922 merchant ships are prohibited from discharging oily ballast water within three miles of the shore. There is, however, always the risk that oil so discharged may be washed or blown back to the shore, and from the point of view of preventing pollution of the coast there are obvious advantages in removing the oil before the water is pumped into the sea, as can be done either in making use of an oil-separating lighter in port or by fitting oil-separating plant in the ships themselves.

## Chemical Industry Club

THE secretary of the club (Mr. J. Arthur Williams) announces that the annual dinner will be held on Friday evening, November 14, at 7.30 p.m., in the Edward VII. Rooms, Hotel Victoria, Northumberland Avenue, London. This year, the secretary adds, owing to a clashing of dates, an opportunity occurred for the Club to unite with the Society of Chemical Industry for the annual dinner, and it was felt by the executive committee that the Club should do what lay in its power in this way to support the general desire for unity of action amongst chemical organisations. The President of the Society of Chemical Industry (Mr. W. J. U. Woolcock) will preside at the dinner, previous to which there will be a reception of guests by the presidents of both organisations. This year the dinner will be open to ladies. Applications for tickets (12s. 6d., not including wine) may be addressed to the General Secretary, Society of Chemical Industry, 46–47, Finsbury Square, London, E.C.2.

The secretary of the Club also announces that the annual general meeting of members will be held during October on a date yet to be fixed. The business will include the filling of certain vacancies on the executive committee. The retiring members are Messrs. Ashley Carter, W. H. Coleman, Harley Knight, and Melville-Smith. Nominations of candidates for these vacancies must be made by two members of the Club, and the last date for receiving them is to-day (September 20).

## The "Chemists' Exhibition"

THE "Chemists' Exhibition," organised by the *British and Colonial Pharmacist* for the benefit of pharmacists in various centres, was opened at Leeds on Monday, having been at Manchester the previous week. The greater proportion of the exhibition, which is open to the trade only, is devoted to proprietary drugs and toilet articles. A point of interest which is to be noted, however, is the use of a non-dutiable substitute for alcohol in perfumes by one firm, which has had the effect of considerably lowering the price. Another introduction which has not long been on the market is British-made synthetic menthol, which has resulted from research carried on by a well-known firm. This menthol is of definite chemical composition and it is said to have already had a considerable sale in Germany, and the United States in place of the natural Japanese product which has lately been increasing considerably in price.

# From Week to Week

MR. GEORGE W. PATON has been elected chairman of Bryant and May, and Mr. Clarence E. Bartholomew deputy-chairman.

REPORTS FROM GERMANY state that the Phosphate Syndicate has received a credit of $6,000,000 to advance supplies from America.

MR. ALWYNE MEADE, the well-known author of "Modern Gasworks Practice," left London on Saturday for a short Mediterranean cruise.

THE DEATH IS ANNOUNCED of Mr. Reginald Gillett, J.P., of Primrose House, Clitheroe, managing director of the Primrose Bleach Works.

REPORTS FROM WARSAW state that the law recently enacted establishing a State monopoly in alcohol will come into operation on October 4.

THE SEWERAGE COMMITTEE of Sedgley District Council has approved a sewerage and sewage disposal scheme at an estimated cost of £76,000.

THE THIRD PAN-AMERICAN SCIENTIFIC CONGRESS will be held at Lima from December 20th, to January 6, 1925. The congress synchronises with the opening of the Exhibition of Mining and Metallurgy at Lima.

THE MCGRAW-HILL PUBLISHING CO., LTD., of 6, Bouverie Street, London, has just issued a list of their publications dealing with mining. Each book is briefly described and full publishing details are given.

MR. ALFRED LUND, of Pudsey, near Leeds, has presented the sum of £5,000 to the University for the foundation of scholarships for students of the textile and colour chemistry and dyeing departments of the college.

A COURSE of 24 university extension lectures on "The History of Science" will be given at Gresham College, Basinghall Street, London, E.C., by Dr. C. Singer, beginning on September 29. The first lecture will be free.

MR. JOHN ALLEN, whose death is announced, was chairman of Frederick Allen and Sons, Ltd., chemical manufacturers, of Poplar. He was a Fellow of the Chemical Society and a member of the Society of Chemical Industry.

DANIEL ADAMSON AND CO., of Dukinfield, near Manchester, has received an order from the Dartford Rural District Council for two sets of pneumatic sewage lifting ejectors. This plant is for use in connection with the Stone and Swanscombe sewerage scheme.

THE CONFERENCE OF THE TRADE UNION EXECUTIVES concerned in the claim for a 10 per cent. advance on operatives' wages in the bleaching, dyeing, and kindred trades, which was to have been held in Manchester on September 13, has been postponed.

CHROME AND MICA MINING ACTIVITIES are reported from Rhodesia. Recent assays have given chrome contents amounting to as much as 72 per cent. in the Lomagundi area, but lack of transport facilities at present prevents extensive exploitation.

WE REGRET that in the advertisement of Price, Stutfield and Co., Ltd., in THE CHEMICAL AGE of last week, "natural salts" was inadvertently substituted for "natural colours" in the list of products the firm are specially inviting overseas buyers to inspect.

THE NEW CUNARDER *Aurania* has been fitted with "Kelvite" compasses and "Kelvite" motor sounding machine. In the engine department a full equipment of pneumercator tank gauges has been fitted, all manufactured by Kelvin Bottomley and Baird, Ltd., Glasgow.

SIR CHARLES PARSON, the inventor of the steam turbine, Sir Ernest Rutherford, of Cambridge, and Professors Coker and Donnan, of University College, London, are among the British visitors at Philadelphia for the celebration of the centenary of the Franklin Institute this week.

LORD LEVERHULME is to pay a visit to West Africa in the interests of the Niger Company. He will be accompanied by the chairman of the company, and will make an extensive tour of the company's properties, also visiting all the ports in which Lever Brothers are interested. He will be away about six months.

AN ARTICLE on the catalytic hydrogenation of liquid organic products, translated from the English of Drs. E. F. Armstrong and T. P. Hilditch, appears in the September number of the French chemical journal, *Chimie et Industrie*. A review is given of recent research, and particular mention is made of the hydrogenation of cinnamic aldehyde, carvone, and citral.

THE UNIVERSITY OF PENNSYLVANIA has decided to confer the Honorary Degree of Doctor of Science on Sir William Henry Bragg, London University; Sir Charles Parsons, of turbine fame; Dr. Charles Fabry, of the University of Paris; Mr. Edwin Wilbur, vice-president of the General Electric Co.; and Professor Pieter Zeeman, of the University of Amsterdam;

A NEW PROCESS for the production of oxalic acid is described by the Paris correspondent of *Industrial and Engineering Chemistry*. M. Martignon uses carbon monoxide and potassium carbonate as in the processes now employed, but he works at a temperature of 470° C. and under a pressure of 250 atmospheres. Under these conditions the reaction is complete.

KEEN COMPETITION IS REPORTED from America between the Cassel Cyanide Co., of Glasgow, and the American Cyanide Co., for the custom of the gold and silver mining companies of Northern Ontario. A few years ago the Scottish company supplied practically all the needs of this district, but to-day reports state that the American company is increasing its sales rapidly, being able to produce at a lower price.

A NEW COMPANY is announced in Antwerp "for the industrial and commercial exploitation of chemical products." The capital is 1,600,000 frs. of 500 fr. shares, 3,180 of which will be applied to the remuneration of various values brought in by Fraracci Brothers, to whom are allotted, in addition, 3,180 out of 3,200 founders' shares. The first board includes P. and Michele Fraracci and F. Verhoustraeten.

THE LONDON COUNTY COUNCIL has issued an informative booklet indicating the courses in technical and industrial chemistry available at the various polytechnics and institutes under council Control in the London area. A special feature of many of the programmes is a series of evening classes in various branches of commercial chemistry, and in a foreword to the booklet firms are recommended to send their employees to these classes that they may be kept up-to-date and gain a fuller knowledge of their subject to the mutual advantage of those concerned.

THE THIRTEENTH ANNUAL CONFERENCE of the British Commercial Gas Association is to be held in Liverpool under the presidency of Alderman H. Wade Deacon, on Monday, Tuesday and Wednesday, September 29 and 30, and October 1. The speakers at the public conference on October 1 will include the Bishop of Liverpool (Dr. A. A. David), who will deliver an address on "The Worker and his Work"; and Sir Lawrence Weaver, director of United Kingdom Exhibits at the British Empire Exhibition, who is to speak on "Art in Industry."

THE COUNCIL of the British Cast Iron Research Association has appointed Mr. J. G. A. Skerl, M.Sc., to take charge of an important investigation on moulding sands. Mr. Skerl has for nearly three years been research assistant to Professor P. G. H. Boswell, of the University of Liverpool, who has done so much work on moulding sands. The new work will be conducted in the Refractories Department of the University of Sheffield (Mr. W. J. Rees, F.I.C.), and in the foundries of members of the Association. The investigations contemplated are of such a character that the results may be made of immediate and practical utility to the ironfounding industry.

THE GRECIAN MAGNESITE (MARKETING) CO., LTD., of 24, Finsbury Square, London, E.C.2 (the distributing company for the Anglo-Greek Magnesite Co., Ltd, and Huyzers Magnesite Works), has been formed by the two producers of Grecian caustic magnesite mentioned, in order to sell their production direct to consumers. The change in marketing policy is intended to meet the desire of consumers to buy direct from the producer and to give them a guarantee that the product they receive is a pure Grecian magnesite. In conformity with these arrangements the company has appointed as its agents in the Midlands and North of England the firm of Ryding and McCulloch, of Westinghouse Road, Trafford Park, Manchester.

THE BLACK MATERIAL ILENITE can now be transformed into an intensely white powder consisting of titanium dioxide by a process developed by two Norwegian chemists. An American company has also developed the same process independently and the two firms marketing the new paint thus produced, have come to an agreement with regard to areas of sale.

THE BRITISH RESEARCH ASSOCIATION for the Woollen and Worsted Industries announces the following awards for the year 1924–25 :—Fellowships : Mr. Robert Burgess, B.Sc., of Nottingham, to enable him to continue his research at the University College, Nottingham, on the bacteriology and mycology of wool ; Mr. J. E. Nichols, B.Sc., of Edinburgh, to conduct research at the Animal Breeding Research Department of the University of Edinburgh on the relationships between the wool fibres of various breeds of sheep ; an advanced scholarship has been granted to Mr. H. Maldwyn Williams, tenable at the Scottish Woollen Technical College, Galashiels.

PRINCE ARTHUR of CONNAUGHT has consented to undertake in November the formal opening of the Ramsay Laboratory of Chemical Engineering at University College, instituted in 1923 as part of the Memorial to the late Sir William Ramsay, K.C.B., F.R.S. A full course of study in chemical engineering will be provided in the laboratory in the coming session, leading to the degrees of M.Sc. or Ph.D. in Chemical Engineering. The course is designed to meet the demands of the manufacturing industries for men trained in the application of scientific methods to the design and operation of industrial chemical processes and plant. Special facilities are provided for research. Full particulars may be obtained from the Secretary of University College, London.

## Arsenic in Food Wrappers

IN his annual report Mr. G. D. Elsdon, B.Sc., F.I.C., borough analyst, Salford, deals with the questions of adulterations, preservatives, and chemical ingredients in foodstuffs based on the analyses made by him during the past year. The presence of potassium nitrate was detected in many instances in milk, and a " table syrup " was found to contain no less than 90 per cent. of glucose syrup. Glucose or corn syrup is prepared by the action of dilute sulphuric acid or other acid on starch. In five out of twenty samples of jam tested for the presence of salicylic acid the acid was found.

During the examination of a sample of proprietary bread, he states it was discovered that the violet ink used for the printing on the wrapper contained appreciable quantities of arsenic. As a result of this discovery a large number of coloured wrappers and labels and a number of coloured papers have been examined to discover whether or no they contained arsenic. In all, 51 samples have been examined, and of these nine contained an appreciable quantity of arsenic. These nine samples consisted of two blue papers, five purple papers and two green papers. The quantity of arsenic in one paper faced with a purple colour was about one-third of a grain per square foot. Nine samples of ink largely used in printing were examined. These consisted of three blues, one violet, one water violet, one red, two greens, and one yellow. All these inks were practically free from arsenic with the exception of one violet ink, which contained about 10 per cent. of arsenic calculated as arsenious oxide.

## Alleged Fraudulent Chemical Deal

AT the Manchester City Police Court on Friday, September 12, Harold Stanley Davenport, of Langshaw Street, Old Trafford (remanded from September 4, as reported in THE CHEMICAL AGE last week), was charged with obtaining quantities of Epsom salts by false pretences or other fraud from John Ryding and Co., Trafford Park. The charges related to supplies, first, of three tons, then of seven tons, and afterwards of ten tons. Davenport made inquiries, according to the evidence, by telephone, asking the price of Epsom salts of commercial quality. He was informed that the price was £4 15s. a ton. The prisoner then asked if a reduction could be made, and the price finally agreed upon was £4 12s. 6d. a ton. Mr. F. Webster, who appeared for the police, said the first quantity of the salts obtained—namely, three tons—was sold by the prisoner on the day he bought them at £3 10s. a ton. The remainder of the goods supplied he sold at £3 5s. a ton. The prisoner was committed for trial at the Assizes.

## Competition in Artificial Silk

THAT artificial silk should be subject to foreign competition is no new thing, *The Times* states, any more than is the product itself, which has been manufactured for more than 30 years past. Overseas business in the material has been recorded by the Board of Trade for some 16 years, but it was not until 1920 that shipments were fully entered. The subsequent growth of foreign competition was as follows :—

(In Thousands of Pounds.)

| | 1923. | 1922. | 1921. | 1920. |
|---|---|---|---|---|
| | £ | £ | £ | £ |
| Imports .. .. .. | 4,425 | 2,559 | 1,200 | 640 |
| Re-exports .. .. | 382 | 290 | 138 | 173 |
| Net imports .. .. | 4,043 | 2,269 | 1,062 | 467 |
| Exports .. .. .. | 3,460 | 2,624 | 1,706 | 3,007 |
| Excess of exports .. .. | — | 355 | 644 | 2,540 |
| Excess of imports .. | 583 | — | — | — |

It will be seen that last year, for the first time, we imported more than we exported. The reason for this was that foreign makers sold at lower values than our manufacturers were then prepared to accept. In 1922—the latest year for which quantities are at present published—imported artificial silk was worth only 7s. 6d. per lb., against nearly 11s. for the exported article. British prices have come down heavily since then, and British manufacturers appear now to be holding their own. Returns of trade for the eight months to August are :—

| | 1924. | 1923. |
|---|---|---|
| Imports .. .. .. | £3,111,000 | £2,611,000 |
| Re-exports .. .. .. | 426,000 | 233,000 |
| Net imports .. .. .. | 2,685,000 | 2,378,000 |
| British exports .. .. .. | 2,633,000 | 2,275,000 |

There is no evidence here of the trade being overwhelmed by a flood of foreign material, and it seems not improbable that the present year may end with a balance in favour of our own producers.

## Important American Amalgamation

ON October 1, Burton T. Bush, Inc., of New York, manufacturers of aromatic chemicals, will become the sole North American sales agents for the products of L. Givaudan et Cie of Geneva, Switzerland, and Lyons, France. At the same time, Givaudan will secure a one-third share in the plant of Burton T. Bush, Inc., at Delawanna, N.J., where various aromatic chemicals, now produced by Givaudan in Europe, will be manufactured for American consumption. The Bush plant at Delawanna will continue to manufacture its present line, and Givaudan products not made previously will be added from time to time as the processes are perfected. Bush chemists are now at Givaudan works abroad. The Bush plant at Delawanna was purchased some months ago by Mr. Burton T. Bush from the Antoine Chiris Co., New York, of which company he was formerly president.

An official announcement, issued on September 2, states that until October 1, Givaudan products will be sold by their present agents, George Lueders and Co., but on and after October 1 all products formerly manufactured by Givaudan, as well as the products manufactured at Delawanna, will be offered throughout the United States, Canada, Cuba and Porto Rico, by Burton T. Bush, Inc.

## Tariff Changes

AUSTRALIA.—A Dumping Freight Duty is imposed on Portland cement exported from the United Kingdom when sea freight charges are less than 4s. 6d. per cask, the duty to be charged only when the cement is landed at a price detrimental to the local industry.

HUNGARY.—A recent Decree permits the importation of the following goods without an import licence and also modifies the Customs duties leviable on certain of them : Oleic acid, resin cement, potash, calcium carbide, glycerin (crude or refined), refined naphthaline, oil and lac varnishes.

PORTUGAL (MADEIRA).—The importation of spirits and pure alcohol has been prohibited.

SYRIA AND LEBANON.—Kerosene (*petrole*) and benzine have been added to the list of articles which are admitted at the reduced rate of duty of 11 per cent. *ad valorem*. This rate will also be applied, under certain conditions, to quantities of these articles imported prior to the promulgation of the Decree.

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# Patent Literature

## Abstracts of Complete Specifications

220,341. RUBBER, MANUFACTURE OF. P. Schidrowitz, 57, Chancery Lane, London, W.C.2, and M. S. Stutchbury, 7, Gracechurch Street, London, E.C.3. Application date, February 21, 1923.

Specification No. 193,451 (see THE CHEMICAL AGE, Vol. VIII, p. 348) describes a process for producing a vulcanised rubber latex. This colloidal suspension is sprayed into a gaseous drying medium so that it is substantially dry, containing about 0·5 per cent. of moisture. The product contains all the solid constituents of the original latex, and is a vulcanised rubber which is ready for treatment by compressing, sheeting, moulding, forcing, or extruding, and similar operations, which cannot be carried out with ordinary vulcanised rubber. The product differs from ordinary vulcanised rubber in that it remains in a plastic condition for a considerable time if kept in airtight receptacles. Filling materials such as colloidal clay, carbon black, dyes, pigments, fibres, etc., may also be incorporated with the rubber. For some purposes the vulcanised latex may be sprayed so as to leave suitable proportions of moisture in the product.

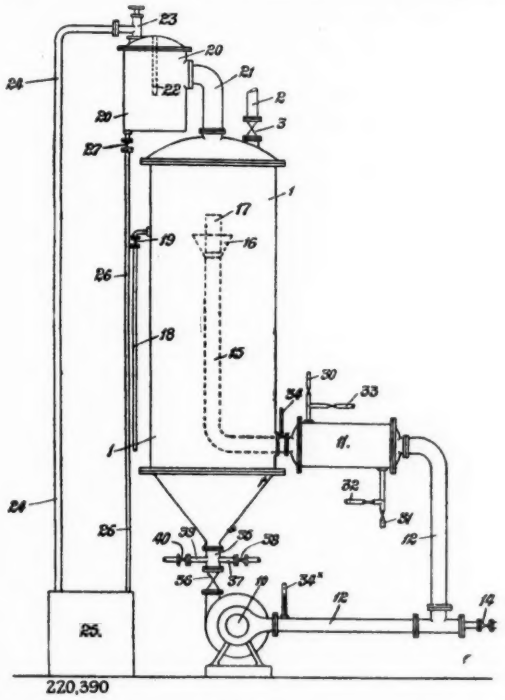
220,358-9. SEPARATING ZIRCONIUM AND HAFNIUM, PROCESS OF. H. Wade, London. From Naamlooze Vennootschap Philips' Gloeilampenfabrieken, Eindhoven, Holland. Application date, May 9, 1923.

220,358. The separation of zirconium and hafnium is effected from a solution of the double fluorides, or from the corresponding acids, by fractional crystallisation. These double fluorides have the formula $X_2ZrFl_6$ and $X_2HfFl_6$ in which X is a metal such as potassium. The separation is effected in the presence of hydrofluoric acid, and preferably also an excess of the cation, the latter being obtained by adding a soluble salt containing the same metal X. The double fluoride solution may be obtained by adding potassium bifluoride, KFl.HFl, to the commercial oxide of zirconium and fusing the mixture; or by dissolving the mineral in hydrofluoric acid and adding potassium bifluoride; or by fusing the mineral with some other medium and converting the product into the double fluoride. When the double fluorides are crystallised, the hafnium salt is more easily soluble than the zirconium salt, so that by repeated crystallisation the zirconium salt may be eliminated. Any admixture of titanium, niobium and tantalum may be removed by converting the mixture into hydroxides, then into oxychlorides with hydrochloric acid, and then treating with hydrochloric and alcohol, which dissolves the impurities leaving pure hafnium and zirconium. Metallic hafnium may be obtained in the manner known for zirconium.

220,359. Zirconium and hafnium are separated by fractionally precipitating the oxides or hydroxides from solutions, or fractionally converting them into other compounds. The mixture must first be freed from admixtures of other metals, such as titanium, niobium, tantalum, aluminium, iron, etc., in the manner known for purifying zirconium compounds. The mineral may be fused with potassium bifluoride and a base such as ammonia or sodium hydroxide, or a salt such as sodium acetate or thiosulphate is added to the solution to precipitate part of the hydroxide. The precipitate contains proportionally less hafnium than that originally in the mixture, and the process may be repeated. In an alternative method, a mixture of the hydroxide or oxides is treated with insufficient acid to dissolve it completely, and the solution contains comparatively more hafnium than the original mixture. This process may be repeated. The two methods of separation may also be combined.

220,390. THICKENING AND/OR BLEACHING OILS. T. Andrews, 11, Oldhall Street, Liverpool, and Rose Downs and Thompson, Ltd., Old Foundry, Hull. Application date, May 18, 1923.

In the process of thickening and/or bleaching of oils by treating with air, combustible oil vapour may be carried into the atmosphere by the air, and the air carries into the oil a certain proportion of moisture which causes hydrolysis of the oil. In this invention, the treatment is carried on in a closed cycle, and the air is artificially dried. The combined oil and air are forced by the pump 10 into the vessel 1 in which the air acts on the oil, and the mixture is drawn through the pipe 15 to a heat interchanger 11 and back to the pump 10 through a pipe 12. In the vessel 1 the air is liberated at the oil level, and part is continuously passed through the pipe 21 into a vessel 20 containing a baffle 22. The air then passes a loaded valve 23 into the pipe 24, which leads to a collecting vessel 25. The system is maintained at a pressure up to about 100 lb. per square inch. Liquid passes into the pipe 15 through a conical mouth 16, and air by a pipe 17, this arrangement constituting an exhaust ejector, which also draws any foam from the surface of the liquid. The heat interchanger 11 may be heated by steam or hot water, or may be cooled by cold water to maintain the oil at the necessary temperature.



220,390

Fresh air is drawn in through a drying apparatus, and supplied to the system by a pump through a valve 14. The oil should be maintained at about 70°-150° C.

220,413. PURIFICATION OF BURNER GASES AND PRODUCTION OF CHEMICALLY PURE SULPHURIC ACID, PROCESS FOR. M. Krafft, Parkstrasse, Hruschau, Czecho-Slovakia. Application date, June 13, 1923.

The object is to purify the burner gases for sulphuric acid manufacture to such a high degree that they meet all the requirements of the contact process, and enable chemically pure sulphuric acid to be obtained. It is known that the burner gases after freeing from dust still contain very fine particles which are not removed completely by washing in a liquid. This purification takes place more readily if the liquid is boiled under a reflux condenser, so that the vapour condenses on the particles, and the present process makes use of this fact. The burner gases are passed into the bottom of a tower, and the cooling is effected by a stream of dilute sulphuric acid passing downwards through the tower. The acid is continuously vaporised, so that concentrated sulphuric acid arrives at the bottom of the tower, while the vapour condenses on the particles suspended in the gases. It is found that if the speed of the burner gases and the quantity passed through the tower in unit time is too great to allow sufficient condensation on the suspended particles to form large drops, the drops may be of such smaller size that they are easily separable in an electric gas purifier. This avoids the disadvantages (1) that if the gas is caused to flow sufficiently slowly through the tower to completely purify it, it is necessary to supply con-

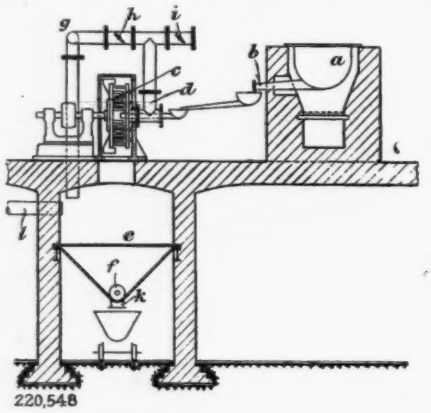
siderable heat to maintain a vigorous evaporation of the liquid, (2) if the supply of external heat is avoided by a very slow current of gas, the process would become a simple washing operation which does not effect a complete purification. The gas is then passed through the electrical precipitator, which removes all the suspended matter and avoids the deposition of impurities such as selenium in the washing liquid. If the purified gas is then passed through a contact apparatus, pure sulphuric acid is obtained. Reference is directed in pursuance of section 7, sub-section 4 of the Patents and Designs Acts of 1907 and 1919, to Specifications Nos. 144,701, 136,464, 119,236, 109,106 and 21,147/1907.

220,505. Dyeing or Colouring Products made with Cellulose Acetate. British Celanese, Ltd., 8, Waterloo Place, London, S.W.1, and G. H. Ellis, of British Celanese, Ltd., Spondon, near Derby. Application date, March 17, 1923.

Cellulose acetate products are dyed with dyestuffs of the aryl or substituted aryl benzo- or naphtho-quinone monoimide series generally comprised in the term indophenols. One member of this series, dimethyl para-amido phenyl 1–4 naphtho-quinone mono-imide was formerly employed in dyeing other fibres. This class of dyestuffs yields blue and violet shades which are not easily attainable in simple azo dyestuffs. These dyestuffs may be reduced to the corresponding leuco body by suitable reagents such as sodium hydro-sulphite, stannous salts, etc. The leuco body is readily absorbed by the cellulose acetate, and may be oxidised by the air or by oxidising agents such as hypochlorites, peroxides, etc., after dyeing. Examples are given.

220,548. Lead Oxide, Process and Apparatus for the Production of. P. Wefelscheid, 17–19, Gervinusstrasse, Frankfurt-on-Main, Germany. Application date, January 16, 1924.

Molten lead is supplied to a centrifugal apparatus, and is atomised by it so that complete oxidation takes place and pure lead oxide is obtained Lead is melted in a vessel *a* and drawn off by a tapping tube *b* to a centrifugal device *c* provided with revolving rods or like members. The lead is atomised, and is oxidised by means of air entering through the conduit *d*. Oxidation is completed during precipitation in the chamber *e*, and the lead oxide is discharged by a conveyor *f*.



220,548

The air is circulated back to the inlet through a conduit *g* and throttle valve *h*, while fresh air is admitted by throttle valve *i*. The circulation is maintained by the centrifugal device, and the temperature is adjusted by regulating the amount of fresh air admitted by the valve *i*. Additional fan blades may be provided on the device *c* if necessary.

Note.—Abstracts of the following specifications, which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention:—203,708 (A. L. Mond–Chemische Fabrik Griesheim Elektron), relating to aluminium fluoride and alkali fluoride double compounds free from iron, see Vol. IX., p. 581; 211,167 (A. Wacker Ges. für Elektro-chemische Industrie Ges.), relating to manufacture of acetic anhydride, see Vol. X., p. 417; 214,578 (Electro-Osmose Akt.-Ges., Graf Schwerin Ges.), relating to the electro-osmotic purification of saccharine juices, see Vol. X., p. 653.

## International Specifications not yet Accepted

218,989. Purifying Mineral Oils. T. Bullinger, 86, Schulgasse, Vienna; M. Melhardt, 13, Zieglergasse, Vienna; H. Weisz, 82, Böcklinstrasse, Vienna; H. Winternitz, 17, Florenc, Prague, and E. Zerner, 1, Neudeggergasse, Vienna. International Convention date, July 14, 1923.

Mineral oil is treated for three hours with hydrogen in the presence of fullers' earth, infusorial earth or other inert adsorbent carrier having a deposit of nickel, with or without cobalt, iron, or copper. Gas oil requires 3% of nickel-kieselguhr and a temperature of 150° C., and black cylinder oil may be agitated at 300° C. and 10 atmospheres pressure with hydrogen.

218,998. Alkali and Aluminium Compounds. Rhenania Verein Chemischer Fabriken Akt.-Ges., Aachen, Germany. International Convention date, July 10, 1923.

Rocks containing alkali, such as phonolite, leucite, phonolite-tephrite, and feldspar are fused or sintered, and the hot substance then treated with water to disintegrate it. The powder is then treated with sulphuric acid yielding a solution which contains all the alkali and alumina. The silica is in a form readily filtered. The solution may be treated to separate the constituents.

219,272–3. Ether. Naamlooze Vennootschap Nederlandsche Gisten Spiritus-Fabriek, Delft, Holland. International Convention date, July 21, 1923.

219,272. Ordinary or purified ether is treated with benzidine to decompose the peroxides present, and the ether is then redistilled.

219,273. Crude anhydrous ether is mixed with benzidine, its homologues, or their derivatives, which crystallise with but do not decompose ether, and the ether is regenerated from the separated crystals. In an example, finely powdered benzidine is dissolved under pressure in boiling crude ether, which has previously been treated with quicklime, sodium or potassium hydroxide, to remove water. The solution is crystallised, and the crystals are dried and heated to 100° C. in an atmosphere of hydrogen to obtain pure ether.

219,024 and 219,327. Separating Hafnium and Zirconium. Naamlooze Vennootschap Philips' Gloeilampenfabrieken, 6, Emmasingel, Eindhoven, Holland. (Assignees of D. Coster, 24, Maximstraat, Haarlem, Holland, and G. von Hevesy, 15, Lille Strandvej Hellerup, Copenhagen. International Convention dates, July 13 and July 18, 1923.

219,024. The crude material containing hafnium and zirconium is dissolved in sulphuric acid or fused with an acid sulphate. The solution is treated with a precipitating agent such as sulphuric acid, or alcohol to separate basic sulphates which contain a different proportion of hafnium. Alternatively, double salts may be obtained by adding ammonium sulphate to the sulphate solution, which are richer in zirconium. In another alternative, double sulphates richer in hafnium are obtained by adding barium chloride or alcohol to solutions of double sulphates. In another alternative, the mixture of zirconium and hafnium sulphates is heated to 450°–600° C. in air, sulphur trioxide, or a neutral gas, or vacuum. The zirconium sulphate is reduced to oxide, and the hafnium sulphate is mainly undecomposed and may be extracted with water.

219,327. The zirconium-hafnium material is treated with sulphuric acid, the hydroxides precipitated with ammonia, and redissolved in hydrochloric acid. The solution is evaporated and cooled, and the oxychloride separating is richer in hafnium. This process may be repeated. Alternatively, the oxychlorides may be precipitated by adding strong hydrochloric acid, or calcium chloride, or alcohol. The precipitation may also be effected by adding water to a solution in strong hydrochloric acid. Alternatively, the mixed chlorides may be subjected to fractional sublimation.

219,276. Thionaphthisatins. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, July 18, 1923. Addition to 210,465. (See The Chemical Age, Vol. X., p. 390.)

To obtain 2 : 3-thionaphthisatin-α-derivatives and 2 : 3-thionaphthisatin, the methylene hydrogen atoms of 2 : 3-naphthioindoxyl are replaced by an easily removable radicle such as an arylimide group or by halogen and the product treated with an organic or inorganic acid. 2 : 3-naphthio-

indoxyl may be condensed with *p*-nitroso-dimethylaniline, and the 2 : 3-thionaphthisatin-α-(4¹-dimethylamino)-anil hydrolysed with sulphuric acid.

219,280. Dyes. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, July 18, 1923. Addition to 189,782. (See The Chemical Age, Vol. IX., p. 152.)

2 : 3-thionaphthisatin or its α-anil or α-halogen derivatives, obtained as in 219,276 (above) is condensed with cyclic compounds containing a reactive methylene group such as indoxyls, thioindoxyls, acenaphthenone, or α-oxyanthracene to obtain thioindigoid dyes. The products may be halogenated in nitrobenzene or sulphuric acid. Examples are given of dyestuffs obtained from α-(4¹-dimethylamino) anil or the α-dibromide of 2 : 3-thionaphthisatin and oxythionaphthene, 2 : 3-thionaphthisatin and 6-chlorothioindoxyl carboxylic acid, α-(4¹-dimethylamino)-anil of 2 : 3-thionaphthisatin and acenaphthenone, or 2 : 3-naphthioindoxyl.

219,287. Recovering Metals and Alloys. Chemische Fabrik Griesheim-Elektron, 31, Gutleutstrasse, Frankfurt-on-Main, Germany, and A. Beielstein, Deutsche Grube, Bitterfeld, Germany. International Convention date, July 20, 1923. Addition to 182,948.

Specification 182,948 describes the recovery or refining of aluminium, magnesium, or their alloys by treating with magnesium chloride. In this invention, other additions such as oxides or fluorides of magnesium, calcium, aluminium, etc., are made before or after melting.

219,299. Dyes. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, July 18, 1923.

A diazo compound of the benzene or naphthalene series is coupled with 4-methyl-2-amino-benzoic acid, rediazotized, and coupled with 2-amino-5-naphthol-7-sulphonic acid or a derivative. Diazotized compounds employed include 2 : 5-dichloraniline-4-sulphonic acid, 2-anisidine-4-sulphonic acid, and as end component 5 : 5¹-dioxy-2 : 2¹-dinaphthyl-7-7¹- disulphonic acid.

219,301. Crystallising and Lixiviating. Aktieselskabet de Norske Saltverker, 26, Uranienborgveien, Christiania. International Convention date, July 17, 1923.

A granulated solid is maintained in suspension, *e.g.*, in producing large crystals or lixiviating, by passing the liquid upwards through a perforated plate in which the perforations are so arranged that the ratio

$$\frac{S}{F} \text{ is less than } \frac{1}{5-\frac{b}{l}+\frac{a-3}{7}}$$

where S is the area of a circular hole having the same fluid resistance as the whole of the perforations, F is the cross section of the suspension chamber, *a* is the distance between the perforations, *b* the width of the perforations, and *l* the length of the perforations. The perforations may be surmounted by upwardly diverging cones.

219,304. Acylated Diamines. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, July 17, 1923.

To obtain mono- or unsymmetrical di-acylated diamines, unsymmetrical disubstituted alkylene diamines are treated with acid halides or anhydrides in the presence of an acid binding agent when necessary. Mono-acylated diamines are obtained by heating an alkylene diamine with an acid or acid ester. A number of examples are given of the production of various diamines.

219,308. Nitrogen and Alkali Sulphites. Metropolitan Vickers Electrical Co., Ltd., 4, Central Buildings, Westminster (Assignees of C. J. Rodman, 422, Holmes Street, Wilkinsburg, Pa., U.S.A., and A. H. Maude, 1113, Walnut Street, Wilkinsburg, Pa., U.S.A.). International Convention date, July 20, 1923.

An atmosphere of nitrogen is obtained by absorbing the oxygen by means of hyposulphite to which an alkali, preferably a bicarbonate, is added as a preservative. In this case the atmosphere contains carbon dioxide also, and the hyposulphite is converted into sulphite or sulphate.

219,322. Distilling Hydrocarbon Oils. J. Tausz, 9, Wörthstrasse, Karlsruhe, Baden, Germany. International Convention date, July 16, 1923.

Petroleum, shale oil, lignite or coal tar oils are distilled, and it is found that all the impurities are collected in one or more fractions within narrow limits. In the case of benzine obtained from brown coal, the colouring and resin-forming constituents are obtained in the fractions distilling at 62·86° C. and 108° C., and these two fractions are removed in a dephlegmator.

Latest Notifications.

221,466. Oil or fat emulsions. Douglas-Pectin Corporation. September 4, 1923.

221,487. Manufacture of highly-active silica gels. Farbenfabriken. vorm. F. Bayer and Co. September 3, 1923.

221,512. Process of and apparatus for producing ethylsulphuric acid. Compagnie de Béthune Soc. Anon. September 7, 1923.

221,513. Production of nitric acid from ammonia. Synthetic Ammonia and Nitrates, Ltd. September 6, 1923.

221,514. Process of producing ammonium nitrate. Synthetic Ammonia and Nitrates, Ltd. September 6, 1923.

## Specifications Accepted, with Date of Application

199,017. Pure alumina, Method of manufacturing. J. Koritschoner and F. Hansgirg. June 9, 1922.

201,531. Vulcanising oils or fats, Process of. J. H. van de Meulen. July 31, 1922.

201,906. Formaldehyde and urea, thio-urea, or their derivatives, Manufacture of condensation products from. F. Pollak. August 2, 1922.

206,831. Acid azo-dyestuffs, Manufacture of. Farbwerke vorm. Meister, Lucius and Brüning. November 10, 1922.

210,734. Furnaces for burning sulphur. Metallbank und Metallurgische Ges. January 31, 1923.

213,536. Halogen albumin compounds, Process for producing. A. Mendel Akt.-Ges, and R. Wolffenstein. March 29, 1923.

220,985. Phenolic condensation products, Manufacture of. H. Wade. (*S. Karpen and Bros.*) May 24, 1923.

221,000. Metallic catalysts used in the hydrogenation of oils and like substances, Process for the preparation and reactivation of. Technical Research Works, Ltd., and E. J. Lush. May 31, 1923.

221,008. Perylene-tetracarboxylic acids or their mono-imides, Process of producing. S. Sokal. (*Kalle and Co., Akt.-Ges.*) June 1, 1923.

221,009. Destructive distillation apparatus. F. Lamplough. June 1, 1923.

221,052. Carbonaceous materials, Processes of treating. M. J. Trumble. July 12, 1923.

221,082. Aluminium alloys, Process for the production of. A. L. Mond. (*Th. Goldschmidt Akt.-Ges.*) September 7, 1923.

221,109. Settling or precipitation tanks. S. Hunter. October 27, 1923.

221,102. Electrolysis of water, Apparatus for. L. Casale. October 10, 1923.

## Applications for Patents

Alexander, A. E. and Stokes, J. S. Synthetic resin composition. 21,297. September 9.

British Cyanides Co., Ltd. Cooper, C. H. and Rossiter, E. C. Manufacture of articles from decorated paper, etc. 21,328. September 9.

British Celanese, Ltd., Ellis, G. H., Hall, J., and Walker, J. Manufacture of basic derivatives of the aromatic series. 21,496. September 11.

British Dyestuffs Corporation, Ltd. Manufacture of accelerators, etc., for vulcanization of rubber. 21,296. September 9.

Coley, H. E. Manufacture of tin. 21,392. September 10.

Coley, Ltd., H. E., and Kekwick, L. O. Production of hydrocarbons. 21,393. September 10.

Dreyfus, H. Manufacture of cellulose derivatives. 21,164. September 8.

Drysdale, W., and Drysdale and Co., Ltd. Rotary pumps, compressors, etc. 21,275. September 9.

Hargreaves, L., and Hutchins, T. W. S. Electrodeposition of metals. 21,602. September 12.

Kersten, J. Decomposition of the alkali chlorides. 21,186. September 8.

Morton Sundour Fabrics, Ltd., and Wilson, J. Dyes and dyeing. 21,198. September 8.

Naamlooze Vennootschap Philips' Gloeilampenfabrieken. Process for separating mixture of zirconium and hafnium halogenides. 21,219. September 8. (Holland, September 15, 1923.)

Nihoul, A. Manufacture of magnesium salts. 21,182. September 8. (France, September 19, 1923.)

Schicht Akt.-Ges., G. Preparation of phosphatides. 21,315. September 9. (Czecho-Slovakia, September 27, 1923.)

Scottish Dyes, Ltd., and Thomas, J. Dyestuffs intermediates. 21,197. September 8.

Synthetic Ammonia and Nitrates, Ltd. Valves. 21,343. September 10. (United States, September 10, 1923.)

# London Chemical Market

***The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.***

*London, September* 18, 1924.

THE past week has shown a fairly satisfactory turnover, although there is still room for considerable improvement.

Export business has been very quiet indeed and few transactions of importance have gone through since our last report.

### General Chemicals

ACETONE is lower in price and the market to-day is £91 to £93 per ton, ex wharf.

ACID ACETIC is a quiet market. Technical is quoted at £44, and pure 80% at £45 per ton.

ACID CITRIC is slow of sale with price nominally 1s. 3d. to 1s. 4d. per lb.

ACID FORMIC is in fair demand and is quoted at £53 to £54 per ton for 85%.

ACID LACTIC.—Unchanged at £43 per ton for 50% by weight.

ACID TARTARIC is still lower in price on forced realisations. Distressed parcels may be picked up at 11½d. per lb.

ALUMINA SULPHATE.—Price continues to droop. 17–18% is quoted nominally at £7 5s. to £7 10s. per ton.

ARSENIC is quiet and nominally £47 to £48 per ton. Manufacturers are asking higher prices for forward delivery.

BARIUM CHLORIDE is fairly active, price unchanged at £14 to £14 10s. per ton.

COPPER SULPHATE.—Remains in fairly good inquiry. Quotation is £23 to £23 10s. per ton.

CREAM OF TARTAR is in small but steady demand at 80s. to 82s. per cwt., less 2½%.

FORMALDEHYDE is very slow of sale although the price seems to have touched bottom. Quotations vary from £51 to £53 per ton.

LEAD ACETATE is in fair demand at £45 to £47 10s. per ton.

LEAD NITRATE.—The market is nominally £43 per ton.

LIME ACETATE.—The tendency is rather weak, there being some sellers below £18 per ton.

METHYL ALCOHOL is lower in price and business has been done at about £60 per ton.

POTASSIUM CARBONATE AND CAUSTIC are quiet and uninteresting.

POTASSIUM PERMANGANATE is weak and price is nominally 7¼d. per lb.

POTASSIUM PRUSSIATE is a slow but steady market and quotations remain at 7¾d. to 8d. per lb.

SODA ACETATE.—An active business has been passing and the price is £23 10s. to £24 per ton.

SODA HYPOSULPHITE is in better inquiry, especially for export, price £9 10s. to £9 15s. for commercial quality.

SODA NITRITE is fairly active at £25 10s. to £26 per ton.

SODA PRUSSIATE has been in much better demand, the tone is rather firmer and business has been done at 4½d. per lb.

SODA SULPHIDE without special feature, price unchanged.

### Bichromates

The English makers have reduced their prices for certain export markets (prompt delivery) as follows :—

EUROPEAN MARKETS AND SYRIA AND ASIA MINOR.—Potash, 5d. per lb. ; Soda, 4d. per lb.

OVERSEAS MARKETS—*i.e.*, South Africa, Egypt, China and Japan, South America, and West Indies.—Potash, 5d. per lb. ; Soda, 4¼d. per lb.

INDIA.—Potash, 5d. per lb. ; Soda, 4d. per lb.

MEXICO.—Potash, 5¼d. per lb. ; Soda, 4⅜d. per lb.

Ultimate destination of goods requires to be stated.

Consular Fees for Mexico and South American markets are included in the above prices.

CONTRACTS.—Ground Bichromate of Potash, ½d. per lb. extra with reduction clause may be made at the above prices for delivery until end December, 1924. A special discount of 1% will be allowed on completion of contracts of 25 tons and over for European markets.

### Coal Tar Products

The fall in the price of petrol has now taken place, and its effects are making themselves felt. At the same time, the curtailed production due to the closing down of coke ovens has prevented benzols and naphthas from falling in value to the extent they would have done had the production remained normal. The production of creosote has also fallen off for the same reason.

90% BENZOL.—This product is worth from 1s. 5½d. to 1s. 6d. per gallon on rails.

PURE BENZOL is rather weaker at 1s. 9d. to 1s. 10d. per gallon on rails.

CREOSOTE is quoted at from 5¼d. to 5½d. per gallon on rails in the North, and 6d. to 6¼d. per gallon on rails in London.

CRESYLIC ACID is in poor demand, being worth 1s. 11d. to 2s. per gallon on rails for the pale, 97/99% quality, the dark 95/97% material being worth 1s. 8d. to 1s. 9d. per gallon on rails.

SOLVENT NAPHTHA remains firm at 11d. to 11½d. per gallon on rails.

HEAVY NAPHTHA is still quoted at from 10d. to 11d. per gallon on rails.

NAPHTHALENES.—The lower grades are available in considerable quantities and are quoted at from £3 10s. to £4 10s. per ton on rails, while the higher grades are in poor demand—the 76/78° quality can be bought at about £7 per ton, and the 74/76° at from £5 10s. to £6 per ton.

PITCH is weak and prices are lower. To-day's values are approximately 55s. to 57s. 6d. f.o.b. London, 52s. 6d. to 55s. f.o.b. East Coast, 50s. to 52s. 6d. f.o.b. West Coast.

SULPHATE OF AMMONIA.—The demand remains satisfactory and prices are unchanged.

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## Nitrogen Products Market

THERE has been practically no variation in the position since our last report.

Prices for export are still £13 5s./£13 10s. per ton for prompt, and £14/£14 10s. per ton for forward, f.o.b. U.K. port.

The home agricultural price for September is £14 2s. per ton in four-ton lots for neutral quality, and a fair demand is being experienced.

The nitrate of soda market has been quiet and only small sales made at £11 8s. per ton. The forward price, however, is firmer and sales have been made at £12 2s. 6d. to £12 3s. 6d. per ton, c.i.f.

The total sales for shipment after July 1, 1924, are upwards of 1,348,000 tons.

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### Methylated Spirit Prices

THE Methylating Co., Ltd., Kinnaird House, Pall Mall East, London, S.W.1, announce that their prices for methylated spirit and finish are being reduced as under :

*England, Scotland and Northern Ireland*, 6d. per gallon all round on and from September 17.

*Irish Free State*, 4d. per gallon all round as and from October 1, 1924.

Other terms and conditions remain as before.

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### Graphite as a Lubricant

A GRAPHITE lubricant (says *The Manchester Guardian Commercial*) must necessarily be soft, and must also possess other physical characteristics which facilitate its adherence to the two surfaces. For this reason flake graphite has proved an efficient lubricant because the foliated, flaky structure promotes adherence. A good graphite lubricant contains over 95 per cent. carbon, but it must not be thought that percentage of carbon is the only reliable guide. Several graphites examined have revealed well over 90 per cent. carbon, but much of the remaining 10 per cent. has been made up of hard siliceous rock or quartz, which may appear in the assay as silica. Material of this kind is highly injurious, and it is a mistake to assume a graphite lubricant to be of high quality merely because the carbon content is satisfactory. Chemical tests are necessary, but a further test should be carried out between engineers' rubbing plates. If the graphite can pass both these it may be be taken as satisfactory.

# Weekly Prices of British Chemical Products

*The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at sellers' works.*

## General Heavy Chemicals

Acid Acetic 40% Tech.—£23 10s. per ton.

Acid Boric, Commercial.—Crystal, £45 per ton. Powder, £47 per ton

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.

Acid Nitric 80° Tw.—£21 10s. to £27 per ton, makers' works according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £11 d/d.; Contract, £10 d/d. 4 ton lots.

Bisulphite of Lime.—£7 per ton, packages extra.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride.—£5 17s. 6d. per ton d/d.

Copper Sulphate.—£25 per ton.

Methylated Spirit 64 O.P.—Industrial, 3s. 1d. to 3s. 5d. per gall. Mineralised, 4s. 2d. to 4s. 6d. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d. Normal business.

Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5¾d. per lb.

Potassium Chlorate.—3d. to 4d. per lb.

Salammoniac.—£32 per ton d/d.

Salt Cake.—£3 10s. per ton d/d.

Soda Caustic, Solid.—Spot lots delivered, £16 7s. 6d. to £19 7s. 6d. per ton, according to strength; 20s. less for contracts.

Soda Crystals.—£5 5s. to £5 10s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£24 per ton.

Sodium Bicarbonate.—£10 10s. per ton carr. paid.

Sodium Bichromate.—4½d. per lb.

Sodium Bisulphite Powder 60/62%.—£18 to £19 per ton according to quantity, f.o.b., 1-cwt. iron drums included.

Sodium Chlorate.—3d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Sulphide conc. 60/65.—About £14 10s. per ton d/d.

Sodium Sulphide Crystals.—£9 per ton d/d.

Sodium Sulphite, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

## Coal Tar Products

Acid Carbolic Crystals.—6½d. per lb. Quiet. Crude 60's, 1s. 9d to 1s. 11d. per gall., according to district. Still quiet.

Acid Cresylic 97/99.—2s. to 2s. 1d. per gall. Demand fair. Pale 95%, 1s. 9d. to 2s. per gall. Fair demand. Dark, 1s. 9d. to 2s. per gall. Quiet.

Anthracene Paste 40%.—4d. per unit per cwt. Nominal price. No business.

Anthracene Oil, Strained.—6½d. to 7½d. per gall. Quiet. Unstrained, 7d. to 7½d. per gall.

Benzol.—Crude 65's.—7½d. to 9d. per gall., ex works in tank wagons. Standard Motor, 1s. 1½d. to 1s. 3d. per gall., ex works in tank wagons. Pure, 1s. 5½d. to 1s. 7d. per gall., ex works in tank wagons.

Toluol.—90%, 1s. 5d. to 1s. 5½d. per gall. Pure, 1s. 8d. to 2s. per gall.

Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.

Creosote.—Cresylic, 20/24%, 8½d. per gall. Not much business. Middle Oil, Heavy, Standard specification, 5½d. to 6d. per gall., according to quality and district. Small export inquiry. Fair demand.

Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 11d. to 1s. 5d. per gall., according to district. Fair demand. Solvent 90/190, 11d. to 1s. 4d. per gall. Fair demand.

Naphthalene Crude.—Market dull. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £4 to £6 per ton. Quiet. Whizzed or hot pressed, £7 to £9 per ton.

Naphthalene.—Crystals and Flaked, £13 to £16 per ton in Yorkshire and London respectively.

Pitch.—Medium soft, 55s. to 60s. per ton, f.a.s. for next season. Frequent inquiries.

Pyridine.—90/160, 19s. per gall. Again dearer. Market firm. Heavy, 12s to 12s. 6d. Little business.

## Intermediates and Dyes

There has been a falling off in business in Aniline Dyes, orders now being received for day-to-day requirements. The outlook is not very promising.

**In the following list of Intermediates delivered prices include packages except where otherwise stated.**

Acetic Anhydride 95%.—1s. 7d. per lb.

Acid H.—3s. 11d. per lb. 100% basis d/d.

Acid Naphthionic.—2s. 4d. per lb. 100% basis d/d.

Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.

Acid Salicylic, technical.—1s. 1d. per lb. Improved demand.

Acid Sulphanilic.—9½d. per lb. 100% basis d/d.

Aluminium Chloride, anhydrous.—1s. per lb. d/d.

Aniline Oil.—7¾d. to 8¼d. per lb. naked at works.

Aniline Salts.—7¾d. to 9d. per lb. naked at works.

Antimony Pentachloride.—1s. per lb. d/d.

Benzidine Base.—4s. per lb. 100% basis d/d.

Benzyl Chloride 95%.—1s. 1d. per lb.

*p*-Chlorphenol.—4s. 3d. per lb. d/d.

*p*-Chloraniline.—3s. per lb. 100% basis.

*o*-Cresol 19/31° C.—4½d. per lb. Demand steady.

*m*-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

*p*-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

Dichloraniline.—2s. 3d. to 3s. per lb.

Dichloraniline S. Acid.—2s. 6d. per lb. 100% basis.

*p*-Dichlorbenzol.—£85 per ton.

Diethylaniline.—4s. 6d. per lb. d/d., packages extra, returnable.

Dimethyaniline.—2s. 3d. per lb. d/d. Drums extra.

Dinitrobenzene.—10d. per lb. naked at works.

Dinitrochlorbenzol.—£84 10s. per ton d/d.

Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.

Diphenylaniline.—2s. 10d. per lb. d/d.

Monochlorbenzol.—£63 per ton.

*B*-Naphthol.—1s. per lb. d/d.

*a*-Naphthylamine.—1s. 4d. per lb. d/d.

*B*-Naphthylamine.—4s. per lb. d/d.

*m*-Nitraniline.—4s. 3d. per lb. d/d.

*p*-Nitraniline.—2s. 3d. per lb. d/d.

Nitrobenzene.—5½d. to 5¾d. per lb. naked at works.

*o*-Nitrochlorbenzol.—2s. per lb. 100% basis d/d.

Nitronapthalene.—10½d. per lb. d/d.

*p*-Nitrophenol.—1s. 9d. per lb. 100 % basis d/d.

*p*-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.

*m*-Phenylene Diamine.—3s. 11d. per lb. d/d.

*p*-Phenylene Diamine.—10s. 2d. per lb. 100% basis d/d.

R. Salt.—2s. 5d. per lb. 100% basis d/d.

Sodium Naphthionate.—2s. 3d. per lb. 100% basis d/d.

*o*-Toluidine.—8½d. per lb.

*p*-Toluidine.—4s. 2d. per lb. naked at works.

*m*-Toluylene Diamine.—4s. per lb. d/d.

## Wood Distillation Products

Acetate of Lime.—Brown £12 per ton d/d. Grey £16 per ton. Market easier. Liquor, 9d. per gall. 32° Tw.

Charcoal.—£7 15s. to £9 5s. per ton, according to grade and locality. Market brisker.

Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.

Red Liquor.—10d. to 1s. per gall. 14/15° Tw.

Wood Creosote.—2s. 9d. per gall. Unrefined.

Wood Naphtha, Miscible.—4s. 10d. per gall. 60% O.P. Market dull. Solvent, 5s. 3d. per gall. 40% O.P. Fairly good demand.

Wood Tar.—£4 5s. per ton. Cheaper.

Brown Sugar of Lead.—£43 per ton. Cheaper.

## Rubber Chemicals

Antimony Sulphide.—Golden, 5¾d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 3d. to 1s. 6d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 11d. per lb.

Barytes.—£3 10s. to £6 15s. per ton, according to quality.

Cadmium Sulphide.—3s. 9d. to 4s. per lb., according to quantity.

Carbon Bisulphide.—£30 to £33 per ton, according to quantity. Again dearer.

Carbon Black.—7d. to 7½d. per lb., ex-wharf. Dearer.

Carbon Tetrachloride.—£60 to £65 per ton, according to quantity, drums extra. Again dearer.

Chromium Oxide, Green.—1s. 3d. per lb.

Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.

Lamp Black.—£48 per ton, barrels free.

Lead Hyposulphite.—7½d. per lb.

Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London.

**Sulphur.**—£10 to £12 per ton, according to quality.
**Sulphur Chloride.**—4d. per lb., carboys extra. Dearer.
**Thiocarbanilide.**—2s. 6d. per lb.
**Vermilion, Pale or Deep.**—5s. 1d. per lb. Dearer.
**Zinc Sulphide.**—7½d. to 1s. 8d. per lb., according to quality.

## Pharmaceutical and Photographic Chemicals

**Acid, Acetic 80% B.P.**—£47 per ton.
**Acid, Acetyl Salicylic.**—3s. to 3s. 3d. according to quality.
**Acid, Benzoic B.P.**—3s. to 3s. 6d. per lb.
**Acid, Boric B.P.**—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
**Acid, Camphoric.**—19s. to 21s. per lb.
**Acid, Citric.**—1s. 4½d. to 1s. 5d. per lb., less 5% for ton lots. Market very weak.
**Acid, Gallic.**—3s. per lb. for pure crystal.
**Acid, Pyrogallic, Crystals.**—6s. 9d. per lb. for 1 cwt. lots. Market firm. Increasing demand.
**Acid, Salicylic.**—1s. 6d. to 1s. 9d. per lb. Demand rather easier.
**Acid, Tannic B.P.**—2s. 10d. per lb. Market quiet.
**Acid, Tartaric.**—1s. 1½d. per lb., less 5%.
**Amidol.**—9s. per lb. d/d.
**Acetanilide.**—2s. 1d. to 2s. 3d. per lb. for quantity. Demand slow.
**Amidopyrin.**—13s. 3d. per lb. Neglected. Stocks low.
**Ammonium Benzoate.**—3s. 3d. to 3s. 6d. per lb. according to quantity.
**Ammonium Carbonate B.P.**—£37 per ton.
**Atropine Sulphate.**—12s. 6d. per oz. for English make.
**Barbitone.**—15s. to 15s. 6d. per lb. Quiet market.
**Benzonaphthol.**—5s. 3d. per lb. Small inquiry.
**Bismuth Salts.**—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
**Bismuth Carbonate.**—10s. 6d. to 12s. 6d. per lb.
**Bismuth Citrate.**—10s. 3d. to 12s. 3d. per lb.
**Bismuth Salicylate.**—9s. od. to 11s. od. per lb.
**Bismuth Subnitrate.**—9s. 8d. to 10s. 8d. per lb.
**Borax B.P.**—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
**Bromides.**—Potassium, 1s. 4d. to 1s. 7d. per lb.; sodium, 1s. 5d. to 1s. 8d. per lb.; ammonium, 1s. 6d. to 1s. 9d. per lb. Market firm and Continental prices fully maintained, with upward tendency.
Calcium Lactate—1s. 5d. to 1s. 9d. according to quantity. Fair demand and steady market.
**Chloral Hydrate.**—4s. to 4s. 3d. per lb. Very firm and scarce.
**Chloroform.**—2s. per lb. for cwt. lots. Very steady.
**Creosote Carbonate.**—6s. 6d. per lb. Little demand.
**Formaldehyde.**—£59 per ton, ex works. English make in casks. About 8s. per cwt. extra for carboys.
**Glycerophosphates.**—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
**Guaiacol Carbonate.**—10s. 6d. to 11s. 3d. per lb.
**Hexamine.**—3s. 6d. per lb. for English make. Market quiet and steady.
**Homatropine Hydrobromide.**—30s. per oz.
**Hydrastine Hydrochloride.**—English make offered at 120s. per oz.
**Hydroquinone.**—4s. 3d. per lb. in cwt. lots. Foreign make.
**Hypophosphites.**—Calcium, 3s. 6d. per lb. for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
**Iron Ammonium Citrate B.P.**—2s. 1d. to 2s. 5d. per lb., according to quantity.
**Magnesium Carbonate.**—Light Commercial, £36 per ton net.
**Magnesium Oxide.**—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 1s. 6d. to 2s. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 57s. 6d. per lb. Synthetic, 26s. to 31s. per lb., according to quantity. English make.
**Mercurials.**—Market very quiet. Red oxide, 5s. 3d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 6d. to 3s. 7d. per lb.; white precipitate, 4s. 7d. to 4s. 8d. per lb.; Calomel, 3s. 11d. to 4s. per lb.
**Methyl Salicylate.**—1s. 10d. to 2s. 1d. per lb. Keen competition.
**Methyl Sulphonel.**—26s. per lb.
**Metol.**—11s. per lb. British make.
**Morphine and Salts.**—Reduced by 1s. to 1s. 3d. per oz.
**Paraformaldehyde.**—2s. 10½d. to 3s. per lb. Not very active.
**Paraldehyde.**—1s. 5d. to 1s. 6d. per lb. in free bottles and cases.
**Phenacetin.**—6s. to 6s. 3d. per lb. Price and demand steady.
**Phenazone.**—7s. 2d.
**Phenolphthalein.**—5s. 6d. to 5s. 8d. per lb. in cwt. lots.
**Potassium Bitartrate 99/100% (Cream of Tartar).**—88s. per cwt. less 2½% for ton lots. Firm market. Prices have upward tendency.
**Potassium Citrate.**—1s. 10d. to 2s. 2d. per lb. Dearer.
**Potassium Iodide.**—16s. 8d. to 17s. 5d. per lb., according to quantity. Good steady demand.
**Potassium Metabisulphite.**—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
**Potassium Permanganate.**—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Keen competition keeps prices low.
**Quinine Sulphate.**—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Good market.
**Resorcin.**—5s. 6d. per lb.
**Saccharin.**—63s. per lb. in 50-lb. lots.
**Salol.**—3s. 6d. per lb.
**Silver Proteinate.**—9s. 6d. per lb.
**Sodium Benzoate, B.P.**—2s. 9d. per lb. Ample supplies B.P. quality available.
**Sodium Citrate, B.P.C., 1923.**—1s. 11d. to 2s. 2d. per lb., according to quantity.
**Sodium Hypophosphite, Photographic.**—£13 to £15 per ton, according to quantity, d/d. consignee's station in 1-cwt. kegs.
**Sodium Metabisulphite Crystals.**—37s. 6d. to 60s. per cwt., net cash, according to quantity.
**Sodium Nitroprusside.**—16s. per lb. Less for quantity.
**Sodium Potassium Tartrate (Rochelle Salt).**—75s. to 82s. 6d. per cwt., according to quantity. Market steady, good demand.
**Sodium Salicylate.**—Powder, 2s. to 2s. 3d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb. Flake, 2s. 9d. per lb. Market rather easier.
**Sodium Sulphide, pure recrystallised.**—10d. to 1s. 2d. per lb., according to quantity.
**Sodium Sulphite, anhydrous,** £27 10s. to £28 10s. per ton, according to quantity, 1 cwt. kegs included. In large casks £1 per ton less.
Sulphonal.—15s. per lb. Easier.
**Thymol.**—20s. per lb. Nominal. Very scarce indeed.

## Perfumery Chemicals

**Acetophenone.**—12s. 6d. per lb.
**Aubepine.**—15s. 3d. per lb. Advanced.
**Amyl Acetate.**—2s. 6d. per lb. Cheaper.
**Amyl Butyrate.**—6s. 9d. per lb.
**Amyl Salicylate.**—3s. per lb.
**Anethol (M.P. 21/22° C.).**—4s. 6d. per lb.
**Benzyl Acetate from Chlorine-free Benzyl Alcohol.**—2s. 9d. per lb.
**Benzyl Alcohol free from Chlorine.**—2s. 9d. per lb.
**Benzaldehyde free from Chlorine.**—3s. 6d. per lb.
**Benzyl Benzoate.**—3s. 6d. per lb.
**Cinnamic Aldehyde Natural.**—17s. 6d. per lb. Advanced.
**Coumarin.**—19s. 6d. per lb. Cheaper.
**Citronellol.**—17s. per lb. Again advanced.
**Citral.**—8s. 6d. per lb. Cheaper. Price reduction due to selling competition.
**Ethyl Cinnamate.**—12s. 6d. per lb. Cheaper.
**Ethyl Phthalate.**—3s. 3d. per lb.
**Eugenol.**—10s. 6d. per lb. Cheaper.
**Geraniol (Palmarosa).**—35s. per lb.
**Geraniol.**—11s. to 18s. 6d. per lb.
**Heliotropine.**—7s. 3d. per lb.
**Iso Eugenol.**—15s. 9d. per lb.
**Linalol ex Bois de Rose.**—26s. per lb.
**Linalyl Acetate.**—26s. per lb.
**Methyl Anthranilate.**—9s. 6d. per lb.
**Methyl Benzoate.**—5s. per lb.
**Musk Ambrette.**—45s. per lb. Cheaper.
**Musk Xylol.**—14s. per lb. Again cheaper.
**Nerolin.**—4s. 9d. per lb. Advanced.
**Phenyl Ethyl Acetate.**—15s. per lb. Advanced
**Phenyl Ethyl Alcohol.**—16s. per lb.
**Rhodinol.**—60s. per lb. Advanced.
**Safrol.**—1s. 10d. per lb.
**Terpineol.**—2s. 4d. per lb. Cheaper.
**Vanillin.**—26s. per lb.

## Essential Oils

**Almond Oil, Foreign S.P.A.**—15s. 6d. per lb.
**Anise Oil.**—2s. 6d. per lb. Cheaper.
**Bergamot Oil.**—17s. 6d. per lb. Again firmer.
**Bourbon Geranium Oil.**—36s. per lb.
**Camphor Oil.**—65s. per cwt.
**Cananga Oil, Java.**—10s. 6d. per lb.
**Cinnamon Oil, Leaf.**—6½d. per oz.
**Cassia Oil, 80/85%.**—10s. per lb. Advanced.
**Citronella Oil.**—Java, 85/90%, 5s. 8d. per lb. Ceylon, 3s. 5d. per lb.
**Clove Oil.**—7s. 6d. per lb. Cheaper.
**Eucalyptus Oil, 70/75%.**—2s. 5d. per lb.
**Lavender Oil.**—French 38/40% Esters, 27s. 6d. per lb. Cheaper.
**Lemon Oil.**—3s. per lb.
**Lemongrass Oil.**—3d. per oz.
**Orange Oil, Sweet.**—11s. per lb.
**Otto of Rose Oil.**—Bulgarian, 37s. 6d. per oz. Production below normal. Anatolian, 18s. per oz.
**Palma Rosa Oil.**—17s. per lb. Cheaper.
**Peppermint Oil.**—Wayne County, 30s. per lb. Firm spot and forward. Japanese, 18s. 6d. per lb. Market very active and prices rising.
**Petitgrain Oil.**—9s. 3d. per lb.
**Sandal Wood Oil.**—Mysore, 26s. 7d. per lb. Australian, 21s. per lb.

# Scottish Chemical Market

***The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.***

*Glasgow, September* 18, 1924.

THE heavy chemical market has again been quiet during the past week, and there is nothing of importance to record. Numerous Continental offers continue to be received, and prices are on about the same level as last reported.

### Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £57 to £67 per ton; 80%, pure, £44 to £45 per ton; 80%, technical, £43 to £45 per ton. All packed in casks delivered c.i.f. U.K. ports, duty free.

ACID BORACIC.—Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Nominally 6¼d. per lb. delivered, but could probably be obtained for less.

ACID CITRIC, B.P. CRYSTALS.—Now on offer at 1s. 4d. per lb., less 5 per cent., ex store, in little demand.

ACID FORMIC, 85%.—Unchanged at about £55 10s. per ton, ex store, spot delivery. Offered from the continent at about £53 per ton, ex wharf.

ACID HYDROCHLORIC.—In little demand, price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Quoted 4d. per lb., ex station, prompt delivery. Offered for early delivery at about ⅛d. per lb. less.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Still further reduced. Now quoted 1s. per lb., less 5 per cent., ex store, but could probably be obtained for less.

ALUMINA SULPHATE, 17/18% IRON FREE.—Unchanged at about £8 per ton, ex store. Quoted £7 5s. per ton, c.i.f. U.K. port, prompt shipment.

ALUM.—Ammonium chrome alum on offer at £17 to £19 per ton, according to quality f.o.b. U.K. port for export. Lump potash alum quoted £9 12s. 6d. per ton, ex store, spot delivery. Offered for prompt shipment from the continent at about £8 7s. 6d. per ton, c.i.f. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton; packed in 5 cwt. casks delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantity, containers extra.

AMMONIA MURIATE.—Grey galvaniser's crystals of English manufacture quoted £30 per ton, ex station. Offered from the continent at about £26 10s. per ton, c.i.f. U.K. port. Fine white crystals offered from the continent at £24 12s. 6d. per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—Spot lots quoted £51 per ton, ex store. Moderate inquiry for export and price about £47 per ton, f.o.b. U.K. port.

BARIUM CARBONATE, 98/100%.—Quoted £11 12s. 6d. per ton, c.i.f. U.K. port. 97/99% quality 15s. per ton less.

BARIUM CHLORIDE, 98/100%.—Unchanged at about £14 per ton, ex store, spot delivery. Offered from the continent at about £13 per ton, c.i.f. U.K. port.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station, contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Continental slightly cheaper, now quoted £4 15s. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £3 per ton, ex works, packed in casks, free.

COPPER SULPHATE.—Quoted £24 per ton, f.o.b. U.K. port for export. Continental material on offer at £23 5s. per ton, ex quay.

FORMALDEHYDE, 40%.—Spot lots unchanged at £53 10s. per ton, ex store. Offered for prompt shipment from America at £50 per ton, c.i.f. U.K. port.

GLAUBER SALTS.—English material quoted £4 per ton, ex store or station. Fine white crystals offered from the continent at £3 5s. per ton, c.i.f. U.K. port. Large crystals 10s. per ton extra.

LEAD, RED.—Imported material on offer at £41 per ton, ex store, spot delivery.

LEAD, WHITE.—Quoted £44 per ton, ex store, spot delivery.

LEAD, ACETATE.—Refined white crystals quoted £44 10s. per ton, c.i.f. U.K. port. Brown on offer at £40 per ton, c.i.f. U.K. port. Spot quotations about £1 per ton higher.

MAGNESITE CALCINED.—Unchanged at about £7 17s. 6d. per ton, ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—On offer from the continent at £4 2s. 6d. per ton, c.i.f. U.K. port. Spot lots available at £4 10s. per ton, ex store.

POTASH CAUSTIC, 88/92%.—Quoted £29 per ton, c.i.f. U.K. port. Spot lots on offer at about £30 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¼d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Quoted £22 10s. per ton, c.i.f. U.K. port. Spot lots available at about £25 per ton, ex store. 90/94% quality on offer at about £20 15s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Offered for prompt shipment from the continent at about 2¾d. per lb., ex wharf. Spot lots quoted 3d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Spot lots now quoted £29 per ton, ex store, offered for prompt shipment from the continent at about £26 5s. per ton, c.i.f. U.K. port.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 6d. per lb., ex wharf, prompt shipment from the continent. Spot lots available at about 8d. per lb., ex store.

POTASSIUM PRUSSIATE (YELLOW).—Still in little demand. Quoted 7d. per lb., ex store.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station, spot delivery, contracts 20s. per ton less.

SODIUM ACETATE.—Now quoted £23 5s. per ton, ex store. Offered for prompt shipment from the continent at about £22 12s. 6d. per ton, ex wharf.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

SODIUM CARBONATE, SODA CRYSTALS.—£5 per ton to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material unchanged at £10 per ton, ex station. Continental on offer at £9 10s. per ton, ex store. Quoted £8 5s. per ton, c.i.f. U.K. ports, prompt shipment from the continent. Pea crystals of English manufacture unchanged at £13 15s. per ton, ex station.

SODIUM NITRATE.—Ordinary quality unchanged at £13 10s. per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—In little demand. Spot material quoted £26 5s. per ton, ex store.

SODIUM PRUSSIATE, YELLOW.—In little demand. Quoted 4d. per lb., ex station or f.o.b. U.K. port.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption, £3 10s. per ton, carriage paid, buyer's station. Good inquiry for export and price about £3 per ton, f.o.b. U.K. port.

SODIUM SULPHIDE.—60/65%, solid, of English manufacture, £14 15s. per ton, ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62%, solid, offered from the continent at £12 10s. per ton, c.i.f. U.K. port; broken, £1 2s. 6d. per ton extra; 31/34%, crystals of English manufacture, £9 2s. 6d. per ton, ex station; 30/32% crystals offered from the continent at £8 12s. 6d. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton; ex store, prices nominal.

ZINC CHLORIDE.—98/100% solid offered from the continent at about £24 5s. per ton, c.i.f. U.K. port; 96/98% quoted £23 10s. per ton, c.i.f. U.K. port. English material for export about £27 5s. per ton, f.o.b. U.K. port.

ZINC SULPHATE.—Spot lots of continental material available at £11 10s. per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

### Coal Tar Intermediates and Wood Distillation Products

AMIDO AZO BENZOL.—Some export inquiry. Price 2s. 10d. per lb.

DIPHENYL BLACK BASE.—Some export inquiries. Price, 11s. 6d. per lb.

ETHYL BENZYL ANILINE.—Home inquiry. Price, 6s. per lb. delivered.

G SALT.—Moderate inquiry. Price, 2s. 4d. lb., 100% basis.

META NITRO ORTHO ANISIDINE.—Export inquiry. Price, 6s. lb., f.o.b.

NAPHTHIONATE OF SODA.—Good home inquiries. Price, 2s. 3d. lb., 100% basis.

PARA NITRO ORTHOANISIDINE.—Export inquiry. Price, 25s. per lb.

PARA NITRO ORTHOTOLUIDINE.—Export inquiry. Price, 4s. 6d. lb., 100% basis, f.o.b.

PHTHALIC ANHYDRIDE.—Good home demand. Price, 2s 2d. lb., delivered.

R SALT.—Some home inquiry. Price, 2s. 4d. lb., 100% basis.

# The Manchester Chemical Market

(From Our Own Correspondent.)

*Manchester, September 18, 1924.*

No improvement has occurred this week in the volume of business put through on the Manchester chemical market. Hopes are still centred largely on an expansion of operations in the cotton textile industry, and although for the time being employers have decided against modifying the short-time agreement there is ground for the belief that it is only a postponement of the step. In that case the chemical trade should quickly feel the benefit in the shape of a stronger demand for an important range of products. In the meantime, the demand continues on restricted lines and in some cases prices show a weakening tendency, though the alterations are not particularly important.

### Heavy Chemicals

Hyposulphite of soda is selling only in small quantities, but values continue on the basis of £14 to £14 5s. per ton for photographic crystals and round £9 15s. for commercial quality. Prussiate of soda is quiet and weak at 3⅞d. per lb. Caustic soda is in quietly steady demand both on home trade and export account and quotations are firm at from £16 17s. 6d. per ton for 60 per cent. strength to £19 7s. 6d. for 76–77 per cent. Saltcake remains a rather dull section of the market at about £3 10s. per ton. Glauber salts are also inactive at about the same figure. Sulphide of sodium continues in limited request and quotations are easy at round £14 10s. per ton for 60–65 per cent. concentrated solid and £9 10s. for crystals. Soda crystals are quiet but unchanged from the recent level of £5 5s. per ton. Chlorate of soda is steadier and in fair demand at 2½d. to 2¾d. per lb. Bleaching powder is still on offer at £10 per ton, but the demand for this material is much below normal. Bicarbonate of soda is steady and in moderate inquiry at about £10 10s. per ton. Current values of acetate of soda range from £22 to £23 per ton; business, however, continues on quiet lines. Both home and export demand for alkali keeps up, values being unchanged at round £6 15s. per ton. Bichromate of soda is maintained at 4¼d. per lb. Phosphate of soda is attracting only limited attention, but quotations are fairly steady at £13 10s. to £14 per ton.

Among potash products caustic and carbonate are quoted at about £29 per ton for 90 per cent. material and £22 to £23 per ton respectively; the demand for both these lines is only moderate. Yellow prussiate of potash is quiet and a shade easier at 7d. per lb. Permanganate of potash also has a rather weak tendency, values ranging from 6¾d. to 7¼d. per lb., according to quality, and buying interest keeps small. Bichromate of potash continues fairly steady and in moderate request at 5½d. per lb. Chlorate of potash is unchanged either in position or value at 2¾d. per lb.

Arsenic is still awaiting an improvement in the demand for shipment; values still range from £47 to £48 per ton, Manchester, for white powdered, Cornish makes. The demand for copper sulphate is on a comparatively small scale but prices are maintained at round £24 10s. per ton, f.o.b. Acetate of lime is in moderate inquiry at £16 10s. per ton for grey and £11 to £12 for brown. Nitrate of lead keeps rather quiet but steady at £42 to £43 per ton. Acetate of lead is in slow demand with values fairly steady at £46 for white and £43 per ton for brown. Commercial Epsom salts are well held at £4 10s. to £4 15s. per ton; magnesium sulphate, B.P. quality, is offering at £6 10s.

### Acids and Coal Tar Products

Most of the products in the acid section are moving very slowly and further small concessions have had to be made. Both tartaric and citric acids are quiet and current quotations are 1s. to 1s. 1d. and 1s. 4d. to 1s. 4½d. per lb. respectively. Acetic acid is rather inactive at about £42 per ton for 80 per cent. commercial and round £68 for glacial. Oxalic acid still meets with only limited inquiry at about 4d. per lb.

Among the coal-tar products naphthalenes are still only moderately active, although values keep steady at £16 per ton for refined and £5 and upwards per ton for crude. Actual business in pitch is small and quotations are largely nominal at £2 12s. 6d. to £2 15s. per ton, Manchester. Carbolic acid is quiet at 6¼d. per lb. for crystals and 1s. 10d. per gallon for crude material. Both creosote oil and solvent naphtha are quiet and easy at 5½d. and 1s. 1d. per gallon respectively.

# Chemical Trade Inquiries

***The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.***

Sewerage Works.—Tenders are invited for the construction of detritus tanks, dosing chamber, bacteria beds, humus tanks and the alteration of storm and sedimentation tanks, etc., for Chapel-en-le-Frith Rural District Council. Plans may be seen and the conditions of contract, specification, bill of quantities and form of tender obtained at the office of the engineers, Brady and Partington, Market Street, Chapel-en-le-Frith, on and after September 22, on deposit of £5 (cheque only), which will be returned on receipt of a bona-fide tender and all other documents supplied. Tenders, on the form provided in the bill of quantities (to be returned intact), must be delivered to Mr. L. Jagger, clerk, Council Offices, Chapel-en-le-Frith, under seal and endorsed "Sewage Works," by October 4.

Tar Pitch, Paints, Linseed Oil, etc.—A commission agent, established in Egypt for 18 years with offices, etc. at Cairo and Alexandria, desires to represent British manufacturers for the sale of tar, pitch, paints, linseed oil, rosin and turpentine. Expects to be in London until the end of September, and is prepared to interview prospective principals. (Reference No. .)

Camphor.—A British firm in Montevideo is desirous of communicating with British exporters of camphor in cubes. (Reference No. .)

Chemicals and Oils.—A firm of brokers and commission agents in Nantes is desirous of getting into touch with British exporters of seeds, nuts, oils, fats for soap making, raw materials for oils, chemical manures, nitrate of soda, sulphate of ammonia, raw materials for the manufacture of sulphuric acid, beeswax, and animal waste, with a view to securing their representation. (Reference No. 284.)

Disinfectant Fluid.—H.M. Senior Trade Commissioner in South Africa reports that the South African Railways and Harbours are inviting tenders, to be presented not later than noon on October 13, 1924, for the supply and delivery at certain specified points of 21,400 gallons of disinfectant fluid. Firms in a position to offer British-made disinfectant fluid can obtain full particulars of the contract. (Reference No. B.X./1226.)

Crucible Flaked Graphite.—A Canadian company manufacturing this substance in various grades invites inquiries from British buyers. Full information from Canadian Government Trade Commissioner's office, Portland House, 73, Basinghall Street, London.

Fertilisers.—A gentleman on a visit to this country, with connections among the farming community and importers of agricultural lines, desires to secure the representation for South Africa of British manufacturers of fertilisers. (Reference No. 306.)

Anthracite, Bituminous Coal and Coke.—A firm in Turin wishes to communicate with British exporters of anthracite, bituminous coal and coke with a view to obtaining a commission agency for the sale of these commodities for all Italy. (This is a repetition of a notice which appeared in the "Journal" of May 22.) (Reference No. 313.)

## Lime in Pearl Form

The Berlin firm of H. Scheidemandel has succeeded in producing lime and gelatin in the form of beads or pearls, says *Industrial and Engineering Chemistry*. These pearls are produced by passing lime or gelatin through fine openings into a fluid or gaseous medium. In falling the drops form, as a result of the surface tension, as pearl-like, spherical bodies. Through appropriate cooling of this medium the pearls gelatinise in less than a minute. An ingenious apparatus makes it possible, by absolute prevention of premature decomposition due to heat, for the pearls to possess the same qualities as the liquid lime or gelatin before being made into pearls. In this way a great saving in time and space is accomplished. According to the new process it will be possible in the future to produce lime and gelatin in hot countries, which has hitherto been impossible.

# Company News

DOMINION GLASS CO.—A quarterly dividend of 1¾ per cent. is announced, payable on October 1.

AMALGAMATED ZINC (DE BAVAY'S).—A dividend of 1s. per share, less income tax, is announced.

ASBESTOS CORPORATION OF CANADA.—For the quarter ending September 30 a dividend of 1½ per cent. has been declared on the preferred stock.

NEW TAMARUGAL NITRATE CO.—The local board in Chile have declared an interim dividend of 10 per cent. on account of the profits for the year to July 31 last.

SHAWINIGAN WATER & POWER CO.—A dividend of $1¾ per share is announced on the common shares for the quarter ended September 30, payable on October 10.

PARKES CHEMISTS, LTD.—A dividend is announced on the preference shares for the half-year to August 31 at the rate of 6 per cent. per annum, less tax, payable on September 20.

LEVER BROTHERS, LTD.—The transfer books of the company's registered first mortgage debenture stock were closed on September 17 and will remain closed until September 30, inclusive.

BROKEN HILL SOUTH CO.—The profits for the year ended June 30 were £536,232, of which £301,500 was derived from crude ore, and £234,732 from dump slimes. The net profits amounted to £458,377.

W. J. BUSH AND CO., LTD.—The share and debenture transfer books will be closed from September 21 to September 30, inclusive, for the preparation of the debenture interest and preference dividend warrants.

BENZOL AND BY-PRODUCTS, LTD.—The preference shares transfer books will be closed from September 22 to September 30, both days inclusive, for the preparation of dividend warrants payable on October 1.

FERODO COMPANY.—The net profits for the year ended June 30 were £72,988. A dividend of 20 per cent. is proposed on the ordinary shares, adding £15,000 to the reserve and £7,400 to the capital account, and carrying forward £7,779.

ELLIOTT'S METAL CO.—The net profit for the year ended August 2, including income from investments, amounted to £63,656. The dividend on the ordinary shares is at the rate of 10 per cent., less tax, against 15 per cent. for the previous year.

CALICO PRINTERS' ASSOCIATION.—The accounts for the year ended June 30 last show a profit, after providing £522,738 for maintenance, depreciation, repairs, etc., and £128,000 for debenture interest, of £540,786, and £235,432 was brought forward. A dividend on the ordinary shares of 10 per cent. is recommended, and £218,614 is carried forward.

BURT, BOULTON AND HAYWOOD, LTD.—The report covering the year to June 30 last shows a net profit of £72,928, after allowing £20,000 for depreciation, compared with a profit of £43,721 for the previous period of six months, when depreciation absorbed £10,000. A final dividend of 4 per cent., tax free, is proposed, making 8 per cent. for the year.

THE CAPE COPPER WORKS.—It is announced that the Company's works at Briton Ferry, South Wales, which have been closed since 1920, have now been bought by George Cohen, Sons & Co., Ltd., of Commercial Road East, London. The works are stated to have been in existence for over a century, and have a capacity of about 12,000 tons of refined copper a year.

LAWES CHEMICAL MANURE CO., LTD.—Presiding at the annual meeting in London on September 11, the chairman, Mr. E. G. Cubitt, said that the result of the year's working was a comparatively small loss of £4,469, and although that was disappointing it was at least satisfactory to know it was much smaller than in recent years. The company's total sales, although larger than those of the previous year, unfortunately did not reach their anticipations. The first three months of the current year had seen more violent fluctuations in continental exchanges than ever before in a similar period. This affected their trade, especially in superphosphates. They might anticipate a substantially better trade next season as higher prices for all grain were now ruling, which would undoubtedly give farmers the desire and money to buy increased quantities of fertilisers. The report and accounts were unanimously adopted.

BRITISH CELANESE, LTD.—The directors report for the year to February 29 last states that the accounts shows a net loss without allowing for depreciation on buildings, machinery and plant, of £74,046, made up as follows: Trading loss, £34,478; losses on cancellation of erection contracts, £231; debenture and other interest, less interest received, £40,819. Less transfer fees received, £1,483. Trading profits were made during the first months, but they were offset by losses made in the latter part of the year as the result of a serious drop in selling prices. In the current year this fall has been more than neutralised by economies in the costs of production and other expenses. Since the beginning of the present calendar year the production at the Spondon Factory has been steadily increased in order to keep pace with the sales, and the results for the last few months have been satisfactory. The policy of building up the business on a broader basis than had been possible hitherto, in order to make the results of the company's operations less susceptible to market variations, has been continued, the effect being to make the position more secure. This policy has been carried out within the company's present financial resources, and it has not been found necessary to issue any part of the further £300,000 first mortgage debenture stock referred to in last year's report. The annual meeting will be held at Cannon Street Hotel, London, on September 25, at noon.

# New Chemical Trade Marks

## Applications for Registration

*This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information can be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs. Opposition to the Registration of the following Trade Mark can be lodged up to October 10, 1924.*

447,198. For mineral dyes. Class 1. Leopold Cassella and Company Gesellschaft Mit Beschränkter Haftung (a joint stock company organised under the laws of Germany), 50, Feuerbachstrasse, Frankfurt-on-Main, Germany, manufacturers. April 5, 1924. (To be Associated. Sect. 24.) Registration of this Trade Mark shall give no right to the exclusive use of the letters "HY."

*(Opposition to the Registration of the following Trade Marks can be lodged up to October 17, 1924.)*

"SOFNOLITE."

450,580. For chemical substances used in manufactures, photography or philosophical research. Sofnol, Limited, 62, Westcombe Hill, Greenwich, London, S.E. 10; chemical manufacturers. July 29, 1924. (To be Associated. Sect. 24.)

445,323. For acid colours, basic colours, direct colours, oil colours, sulphur colours, chrome colours, paper colours, benzene, toluene, xylene and their derivatives; diazotisable amino compounds and pigment colours (not being paints). Class 1. John W. Leitch & Co., Limited, 78 and 80, New Street, Milnsbridge Chemical Works, Milnsbridge, near Huddersfield, Yorkshire; manufacturers.—February 12, 1924. (By Consent.) Registration of this Trade Mark shall give no right to the exclusive use of the letter "L."

"GLAX-OVO."

450,299. For chemical substances prepared for use in medicine and pharmacy. Joseph Nathan & Co., Limited, 16, St. Helen's Place, London, E.C. 3; merchants.—July 17, 1924. (To be Associated. Sect. 24.) Registration of this Trade Mark shall give no right to the exclusive use of the word "OVO."

449,907. For dyes, not mineral and not for toilet purposes. Wilhelm Brauns Gesellschaft mit Beschränkter Haftung Co. (a Joint Stock Company organised under the laws of Germany), Harzweg, 14 and 15, Quedlinburg, Germany; chemical manufacturers. July 5, 1924.

# Commercial Intelligence

*The following are taken from printed reports, but we cannot be responsible for any errors that occur.*

## County Court Judgments

*[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]*

McNELLY AND CO., Church Street, St. Helens, paint manufacturers. (C.C., 20/9/24.) £13 1s. August 9.

NOAKES, Herbert William, 48A, High Street, Guildford, patent medicine proprietor. (C.C., 20/9/24.) £18 2s. 6d. August 20.

WATERHOUSE AND GRAY, LTD., 51, Stanley Street, Sheffield, manufacturing chemists. (C.C., 20/9/24.) £11 6s. 4d. August 18.

WHITTAKER, James, 1B, Eanam, Blackburn, bleaching fluid manufacturer. (C.C., 20/9/24.) £18 1s. 10d. August 20.

## Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

HEWETT'S WILLESDEN DYERS AND CLEANERS, LTD. (late Hewett and Reynolds, Ltd.). (M., 20/9/24.) Registered September 1, £700 (not ex.) mortgage to Bank, charged on 389, High Road, Willesden, with plot of land at side. *£1,700. December 31, 1923.

### Satisfaction

DYSON (JAMES) AND CO., LTD., Elland, soap manufacturers. (M.S., 20/9/24.) Satisfaction registered September 3, all moneys, etc., registered June 23, 1919.

## Receivership

ALBY UNITED CARBIDE FACTORIES, LTD. S. H. Bersey, of 53, New Broad Street, E.C.2, ceased to act as receiver or manager on September 9, 1924.

## London Gazette, &c.

### Partnership Dissolved

FIDLER (GEORGE) AND SONS (George FIDLER and Wilfred FIDLER), edible fat refiners, Torre Road, Burmantoft, Leeds, by mutual consent as from September 10, 1924. Debts received and paid by W. Fidler.

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### American Sulphate of Ammonia Production

THE recovery of coke oven ammonia in the United States during 1923 exceeds all previous figures, amounting to 619,000 tons according to the preliminary estimates of the Geographical Survey. The figures in 1922 were 476,761 and in 1914 183,000. Even allowing for a reduction when the revised figures are available this year's total will still be a record. It is accounted for by the average operation of the coke plants in question at something over 85 per cent. of their total maximum capacity (100 per cent.) under the most favourable conditions. New ovens were under construction on January 1 this year which will add at least 10 per cent. to the existing capacity, and even in times of depression recovery ovens are operated in preference to beehives because the latter are better able to stand shutting down.

## New Companies Registered

FELIX GLASS CO., LTD., 8, Southampton Row, London, W.C. Manufacturers of and dealers in bottles and other glass articles of all kinds, glass-making plant and machinery, etc. Nominal capital, £1,000 in £1 shares.

GRISCO, LTD. Manufacturers, refiners and blenders of, and dealers in, oils and greases, petrol, varnishes, soaps, etc. Nominal capital, £2,000 in 1s. shares. Solicitors: Mawby and Barrie, Balfour House, 119-125, Finsbury Pavement, London.

HARRY HEYMANN, LTD., 5, Union Street, Bradford. Manufacturers of, and dealers in, dyewares, dyestuffs, chemicals and all kinds of chemical substances. Nominal capital, £3,000 in £1 shares.

PRESTON OIL WHARVES, LTD., Dashwood House, New Broad Street, London, E.C.2. Refiners, distributors, and merchants of crude and refined motor spirit, chemical products, ammonia and tar distillers; distillers or manufacturers of coal, oxides, acids, and other chemical substances. Nominal capital, £10,000 in £1 shares.

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### Badische Anilin's New Acquisition

As a number of Badische Anilin shares were purchased recently by British capital, it will interest our readers to learn, states the *Financial News*, that this enterprise has now acquired a large block of shares of the Rheinische Stahlwerke from the Otto Wolf group. The Rheinische Stahlwerke possess important coal mines, and the purpose of the deal was for the Badische Anilin to secure the fuel required for the production of chemical manufactures. The Badische Anilin already owns the Victoria coal enterprise, but its output only covered about one-third of the quantity required and, moreover, it could not produce certain qualities which are necessary for the chemical works. On the other hand, the Rheinische Stahlwerke produces the quantity and quality of coal and coke required. The Badische Anilin holds 35 per cent. of the total share capital, which is sufficient to secure control. The deal has caused great surprise in German financial and industrial circles, and created a favourable impression regarding the financial position of the Badische Anilin. The shares rose from 16,750 per cent. to 17,750 per cent., and the forecasts concerning the rate at which its share capital will be transformed from paper marks into gold marks have become much more favourable.

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### Fertiliser Progress in China

MORE modern methods are being adopted by Chinese agriculturists. During last year China imported 37,000 tons of fertilisers, valued at approximately £500,000, or more than double the imports for the previous year. Of this amount, the United States supplied the greatest quantity with 41 per cent., followed by Great Britain with 40 per cent., and Japan 11 per cent. Small importations were made during the year from Belgium, Germany, and Denmark. It may be noted that in the period 1920–1922 the British share in this trade tended to diminish. In 1920, Great Britain supplied 56 per cent.; Japan, 30 per cent.; United States, 7 per cent. In 1921, Great Britain, 36 per cent.; Japan, 24 per cent.; United States, 16 per cent. In 1922, Great Britain, 27 per cent.; Japan, 24 per cent.; United States, 37 per cent. It is estimated that consumption of fertilisers during 1924 will be considerably greater than the past year, as the use of fertilisers is said to be becoming more and more popular in China.

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### A Series of Booklets on Nickel

AN interesting series of booklets dealing with nickel alloys and related matters has just been issued by Henry Wiggin and Co., Ltd., of Birmingham, comprising seven volumes of sixteen or more pages. The series is published in either the English or French language, and copies of any of the booklets will be sent to readers applying on their business paper. The subjects covered are:—Nickel silver, alloys of copper and nickel, alloys of nickel and chromium, the electro-deposition of nickel, malleable nickel, "Corronil" (an alloy of copper and nickel containing a small percentage of manganese, with non-corrosive properties), and resistance wires and tapes. Useful information is given of the uses and properties of these products in an attractive form. A similar booklet deals with the properties and uses of the closely related metal, cobalt, which is likely to be used to an increasing amount in the future.